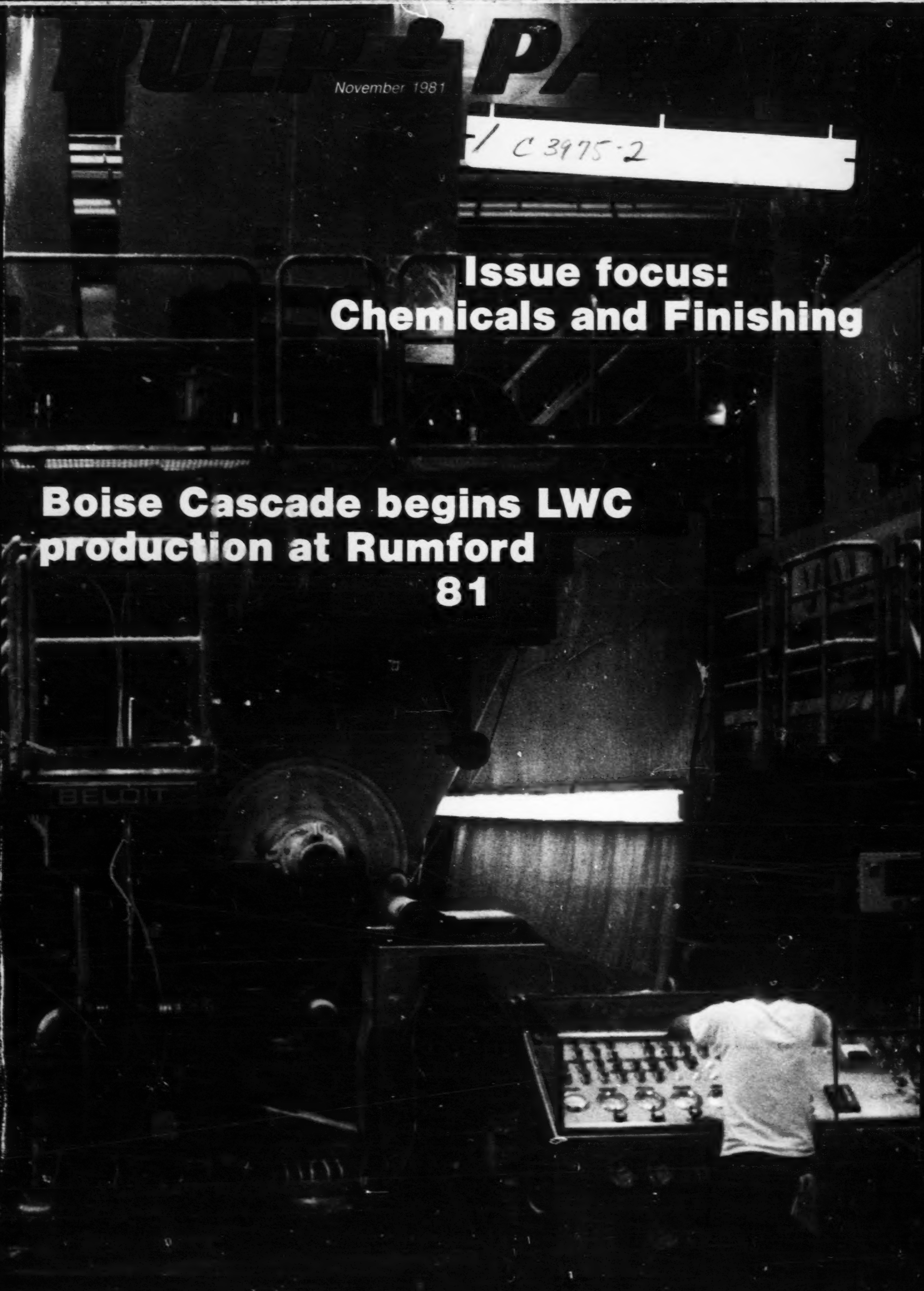

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Cover: Boise Cascade's new 450-tpd paper machine and on-line coater at Rumford, Maine, produces LWC publication papers. (Photo courtesy Beloit.)

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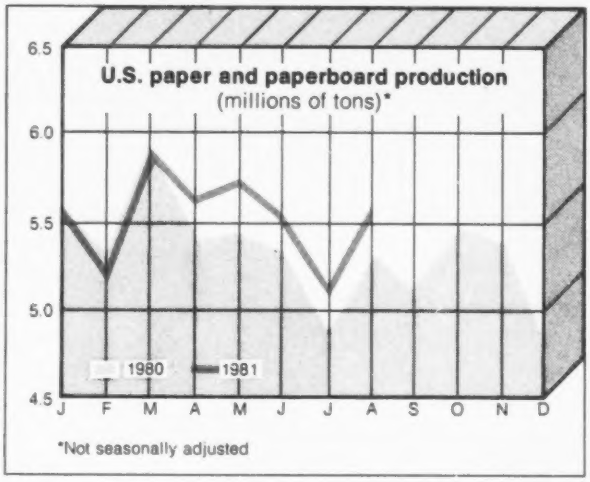
MONTH IN STATISTICS

U.S. paper and paperboard production in August reached 5.6 million short tons, an increase of almost 10% over the previous month and up 6.1% over August 1980 levels, according to the American Paper Institute. Seasonally adjusted production for the July-August 1981 period was at a 65.1-million-tpy rate, near the 65.7-million-tpy rate for the year to date.

Among paper grades, newsprint output continued to show the greatest strength, up 11.9% over August 1980 levels. Production of printing/writing grades eased downward in the July-August period from previous months, about matching the average rate for 1980. The rate of production for packaging and industrial papers for the two months was slightly below average 1980 levels. The rate of paperboard production rose in August, with production of export showing a good recovery and kraft linerboard and bleached paperboard showing most of the strength.

Canadian newsprint shipments in August reached 421,000 metric tons, up 13.5% over the August 1980 levels, according to the Canadian Pulp & Paper Assn. January-August shipments were 3.1 million tons, up 12.0% from 1980. Mill operating rates in August were 82%, down from 90% a year earlier.



*Not seasonally adjusted

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	August	461	11.9	5,216	12.2
Uncoated groundwood (s)	August	129	1.6	1,458	−3.1
Coated paper (s)	August	426	13.0	4,945	7.7
Uncoated free sheet (s)	August	648	0.3	8,015	−0.6
Unbleached kraft packaging and industrial(s)	August	330	3.1	3,974	—
Tissue	August	380	8.3	4,473	1.6
Total paper	**August**	**2,650**	**5.9**	**31,605**	**3.0**
Kraft linerboard, unbleached	August	1,302	6.2	15,041	4.5
Semichemical medium	August	394	3.4	4,851	2.3
Bleached paperboard	August	336	4.7	4,055	3.4
Recycled paperboard	August	620	11.7	7,287	3.3
Total paperboard	**August**	**2,735**	**6.5**	**32,402**	**3.7**
Total paper and paperboard*	**August**	**5,593**	**6.1**	**66,428**	**3.1**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	July	4,076	3.7	52,561	3.2
Market pulp production	July	480	−11.4	6,194	−5.6
Wastepaper consumption at paper/board mills	July	1,115	7.8	14,785	3.9
Pulpwood consumption (cords)	August	6,526	2.7	80,551	−1.0
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	August	20.434	6.4	165.763†	3.9
Containerboard inventories at box plants	Aug. 1	2,371	3.5		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	July	675	1.7	8,473	−7.7
Imports of Canadian newsprint	July	555	2.8	7,032†	−4.8
U.S. paper exports (including products)	July	415	−14.1	4,980	5.7
Exports of unbleached kraft linerboard	August	180	−27.4	1,950	−20.1
Exports of woodpulp	July	261	−20.9	3,003	−0.7
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	August	421	13.5	3,134†	12.0
Operating rates	August	82%	90%	94%	96%
Inventories held by U.S. consumers	Aug. 31	1,451	19.6		
Woodpulp shipments (export only)	August	377	−36.7	4,487†	−6.5
Operating rates	August	62%	97%	86%	96%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn.
*Includes construction and wet machine grades. †Not annualized. ‡Not directly comparable to year ago because of coding change. (s) = shipments.

WORLD CAPACITY

FAO sees modest growth in capacity

Estimated worldwide capacity for production of pulp and paper/paperboard will increase in the 1980-85 period at a lower rate than in 1979-84, but at a substantially higher pace than actual 1975-80 growth. So states the latest annual survey of world pulp and paper capacities compiled by United Nations' Food & Agriculture Organization (FAO) through national pulp and paper trade associations. The findings are similar to those of the recent Pulp & Paper International "Projects Survey, 1981-83" (P&P, July, p. 31).

World capacity for paper-grade pulp is estimated by FAO to rise from 151 million metric tons in 1980 to 169 million tons in 1985, an annual growth of 2.2%. World paper and board capacity is estimated to rise from 198 million tons in 1980 to 225 million in 1985, a growth rate of 2.6%.

The FAO 1981 survey reports that the ratio of pulp-manufacturing capacity to paper and paperboard capacity is continuing to drop. The apparent ratio of paper pulp to paper in 1970 was 80.5%. This dropped to 77.8% in 1975, 76.3% in 1980, and is expected to go down to 75.3% by 1985.

Paper/board grades. Newsprint is the fastest-growing paper grade, with world capacity to increase from 28.4 million tons in 1980 to 34.6 million tons in 1985—an annual growth of 4.0%. Printing/writing grades are expected to reach a growth rate of 3.4%, rising from 47.2 million tons in 1980 to 55.8 million tons in 1985. Other paper/paperboard grades are forecast to rise from 122.3 million tons in 1980 to 134.4 million tons in 1985—a growth rate of 1.9%/year.

In 1980, 78% of paper and paperboard capacity was in the developed countries, 8% in developing countries, and 14% in the centrally planned economies.

Paper-grade pulp. Estimated capacity increase for 1980-85 in paper pulps is 18.1 million tons. This is comprised of: 1.5 million tons mechanical pulp, 4.8 million tons TMP, 0.9 million tons semichemical pulp, 9.2 million tons chemical woodpulp, and 1.7 million tons in other-fiber pulp.

TMP. The 4.8-million-ton increase in TMP will bring 1980 world capacity of 5.1 million tons to 10 million tons by 1985. More than half this growth (2.7 million tons) is scheduled for North America, where capacity is expected to rise from the 1980 level of 2.3 million tons to 5 million in 1985. The Scandinavian countries will account for an added 1.2 million tons of TMP, bringing their 1985 capacity to 2.6 million.

Chemical woodpulp. World total for chemical woodpulp in 1980 is estimated at 95.4 million tons and should grow 1.9%/year to 104.6 million tons in 1985. Chemical pulp constituted 63% of total capacity of paper-grade pulp in 1980, but is estimated to fall to 62% by 1985. Capacity for sulfite is remaining static or, as in Western Europe, gradually declining. Sulfate pulp constitutes 85% to 95% of chemical capacity in North America, Nordic countries, Japan and Latin America; 65% in Western Europe; and 60% in the U.S.S.R.

Market pulp. Worldwide market pulp capacity, estimated at 27.6 million tons in 1980, is expected to grow 10% to 30.5 million tons in 1985. A small capacity decrease in the Nordic countries is expected. Regional distribution in 1980 is: North America, 11.5 million tons; Scandinavia, 7.3 million tons; the rest of Europe, 3 million tons; U.S.S.R., 1.8 million tons; Latin America, 1.8 million tons; Japan, 1.2 million tons; Oceania, 0.7 million tons; and Africa, 0.3 million tons.

World pulp and paper/paperboard capacity, 1975-85

	Capacity (000 metric tons)			Average annual increase (%)	
	1975	1980	1985	1975-80	1980-85
Total woodpulp, paper grades	126,766	139,417	155,796	1.9%	2.2%
Mechanical[1]	29,988	33,567	39,879	2.3	3.5
Semichemical[2]	10,202	10,492	11,376	0.6	1.6
Chemical	86,576	95,358	104,603	2.0	1.9
Other-fiber pulp	9,344	11,615	13,379	4.4	2.9
Total paper, paperboard	175,002	198,001	224,899	2.5	2.6
Newsprint	25,186	28,410	34,619	2.4	4.0
Printing/writing	38,626	47,186	55,773	4.1	3.4

1. Includes thermomechanical pulp
2. Includes chemigroundwood

World thermomechanical pulp capacity, 1978-85
(000 metric tons)

	Capacity				Increase
	1978	1979	1980	1985	1980-85
World total	3,237	3,872	5,148	9,986	4,848
Developed market economies	3,237	3,837	5,033	9,537	4,504
N. America	1,188	1,508	2,331	5,002	2,671
Japan	621	807	964	1,168	204
Scandinavia	1,276	1,285	1,405	2,615	1,210
Other W. Europe	112	113	187	244	57
Oceania	40	124	146	508	362
Developing market economies	—	35	35	319	284
Latin America	—	—	—	204	204
Asia	—	35	35	115	80
Centrally planned economies	—	—	80	140	60
U.S.S.R.	—	—	80	140	60
Eastern Europe	—	—	—	—	—

FINANCE

Capital spending plans down for '81

The U.S. pulp and paper industry is continuing to lower its sights and will reduce 1981 capital spending by 3.8% from 1980. Pulp and paper companies will spend only $6.54 billion in 1981, down from $6.80 billion last year, according to the latest Commerce Dept. survey taken in July/August. Assuming an 8% to 9% increase in cost of capital goods in 1981, this indicates a hefty decrease in real spending by the industry.

These lowered expectations compare with an expected 0.7% decline reported by Commerce in June and a 1.0% decline reported in March, and with spending increases of 21.2% in 1980 and 39.1% in 1979.

By contrast, Commerce reports U.S. manufacturers as a whole plan to lift 1981 outlays by 9.5% in current dollars, before adjustment for inflation.

Construction paper and board: Production at very low level, growth in housing starts is key to recovery

U.S. Statistics:

Construction papers[1]	**1979**	**1980**	**1981e**
Production, 000 tons†	1866	1398	1250
Capacity, 000 tons	2380	2363	2343
Imports, 000 tons	330	436	400
Exports, 000 tons	34	31	20
Apparent U.S. consumption, 000 tons	2162	1803	1630
Construction boards[1]			
Production, 000 tons[1]	3650	2722	3000
Capacity, 000 tons	4539	4548	4522
Imports, 000 tons	315	210	230
Exports, 000 tons	53	55	110
Apparent U.S. consumption, 000 tons	3912	2877	3120

1. Includes both insulating and hardpressed boards; does not include wet machine boards. e = estimate †All tons are short tons.

Grade structure: Construction papers include sheathing papers, felts (roofing, auto, floor), asbestos and asbestos-filled, and flexible wood-fiber insulation. Insulation boards include fibrous-felted board (9.5 to 31 lb/ft^3) for such uses as interior building and wallboard and acoustical tile. Hardpressed boards include wood fiberboard with a density of over 31 lb/ft^3 range, used for cabinet and wall paneling.

Production/capacity: *Construction papers:* 1981 production is estimated to drop to 1.25 million tons, the lowest level in over ten years, an 11% decrease from the 1980 level. Capacity for construction papers has been unchanged for the last five years, at around 2.34 million tons.

Construction boards: For 1981, construction board production will be an estimated 3.00 million tons, an increase of 10.2% over last year. Production of insulation boards was 0.934 million tons in 1980, and should increase to about 0.960 million tons in 1981. Production of hardpressed boards is projected to be 2.000 million tons in 1981, vs 1.79 million tons in 1980.

Capacity for both insulation board and hardpressed board have remained basically unchanged for the last few years at 1.87 million tons, and 2.7 million tons, respectively.

Outlook: The demand for both construction papers and board grades is tied closely with the level of activity in the housing and construction industry. A depressed housing market recently has resulted in weak demand for these grades. In 1980, there were 1.3 million units built, down noticeably from the 1.75-million level in 1979.

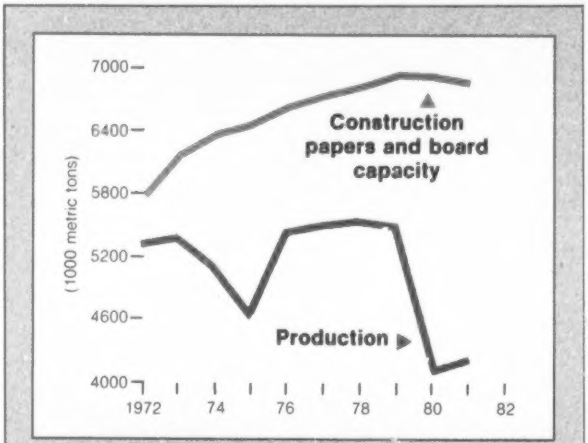
At the start of 1981, housing starts were forecast to rise to the 1.4- to 1.5-million-unit level and higher. However, many industry observers predict about 1.2 million units to be built in 1981, rising to 1.5 to 1.6 million units for 1982. Even if housing starts do pick up, improving demand for construction papers and board, other market factors come into play that affect the long-term outlook.

First, competition from foam insulation in exterior sheathing threatens to erode insulation board market share.

Construction papers are threatened by competition from fiberglass-base felts, which allows a reduction in the amount of expensive asphalt in the finished product. Fiberglass mat is expected to increase its hold on asphalt roofing products from about 20% to 25% currently to 40% to 45% in 1984.

Pricing: Wholesale price index of building papers and board (1967 = 100); 1970, 101.2; 1972, 106.4; 1974, 123.5; 1975, 127.1; 1976, 138.8; 1977, 157; 1978, 187; 1979, 182; 1980, 210; 1981, 240e.

Markets: Nearly all forms of construction papers and board are intermediate products and are converted into finished building products. Production by tonnage is: construction papers, 35%; insulation board, 26%; hardpressed tonnage, 39%.



Estimated capacities for producers of construction papers:	**Annual U.S. capacity**[1] (000 short tons)	**Capacity share** (%)
1. GAF Corp.	360	15.4
2. Owens-Corning Fiberglass Corp.	320	13.7
3. Celotex[2]	281	12.0
4. Bird & Son Inc.	204	8.7
5. Genstar Stone Products[3]	192	8.2
6. Certain-Teed Corp.	180	7.9
7. Johns-Manville Corp.	123	5.5
8. Tamko Asphalt Products	120	5.1

1. Includes, in some cases, capacity for inorganic felts.
2. Formerly Lloyd A. Fry Roofing Co. Div.
3. Formerly Flintkote Co.

U.S. capacity (1981): **2.343 million tons.**
Capacity share of top five companies: 57.9%.

Estimated capacities of insulation board companies:	**Annual U.S. capacity**[1] (000 short tons)	**Capacity share** (%)
1. Celotex Corp.	300	16.0
2. Armstrong World Industries	294	15.7
3. Boise Cascade Corp.	200	10.7
4. U.S. Gypsum Co.	150	8.0
5. Conwed Corp.	95	5.1
6. Johns-Manville Corp.	95	5.1
7. Weyerhaeuser Co.	90	4.8
8. National Gypsum Co.	90	4.8
9. Georgia-Pacific Corp.	85	4.5

U.S. capacity (1981): **1.87 million tons.**
Capacity share of top five companies: 55.6%.

Masonite is the major producer of hardboard with an estimated 32% of the market, followed by Celotex (8.5%), Weyerhaeuser (8%), Superwood (7.5%), and Champion International (7%).

Survey of chemical supply for the pulp and paper industry in the U.S.

PULP & PAPER's annual survey of chemical supply and prices indicates no supply problems through 1982; prices for all chemicals on the rise

By BARRY SHOCKETT

☐ Chemicals are generally in adequate supply this year, with some easing of tight 1980 markets. Caustic soda supply is still tight, although it eased somewhat towards the end of the third quarter due to improved chlorine demand. The sulfur market has also loosened as new capacity has come on-stream and demand from other industries has weakened.

Chemical consumption by U.S. pulp and paper mills is at a higher level, overall, than last year. A relatively strong performance by the industry in general, and by some grades in particular, has kept demand high. Through August, paper production is up about 3%, while board mill output is running ahead of last year by about 3.8%. The newsprint and coated paper sectors have been particularly strong, running 12.2% and 6.4%, respectively, ahead of last year through July.

Prices of chemicals used in the pulp and paper industry have continued their inexorable upward climb, putting increasing cost pressures on the mills. For the first eight months of this year, industrial chemical prices rose almost one-third more than the price of products from the pulp and paper industry (see Figure 1). The price of fuels and power rose over 19% during the same period, which was a major contributor to the rise in paper and

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Mr. Shockett is the consulting editor-chemicals for PULP & PAPER.

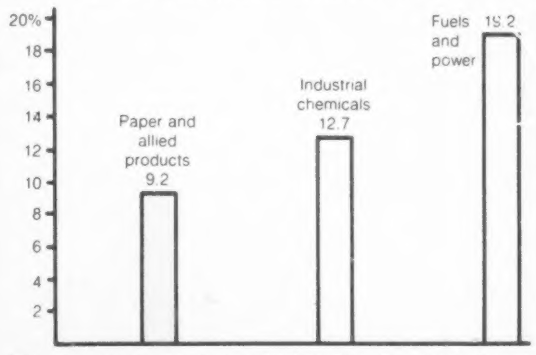


Figure 1. **U.S. price increases for 1981***

* Price increases for chemicals and fuels continued to outpace those for paper products during the first eight months of 1981.

Source: Wholesale price indexes, Bureau of Labor Statistics

Photo courtesy Union Camp Corp.

chemical industry raw material costs. The rise in the cost of fuels in Canada was much larger than in the U.S.

As was the case last year, the price of caustic soda is forecast to rise the most (30%), followed by starch (25%). A 15% rise is expected for chlorine, sodium hydrosulfite, and sulfur (see Figure 2).

The pressure on profits, in an inflationary economy (coupled with a slight recession), was perhaps greatest on the chloralkali producers. For almost a year now, sharp competition has resulted in heavy discounting for chlorine. There have been two attempts to reduce the discounted price (which has been as low as 50% of the official published list), and the industry is waiting to see if the second try will be successful. This would still leave the chlorine selling price about $15 under the published list.

Without noticeable improvements in key markets, such as the housing and automotive industries, chlorine demand will remain stagnant, thus inhibiting the production of caustic. This has led to a rather tight supply situation, recently, for caustic.

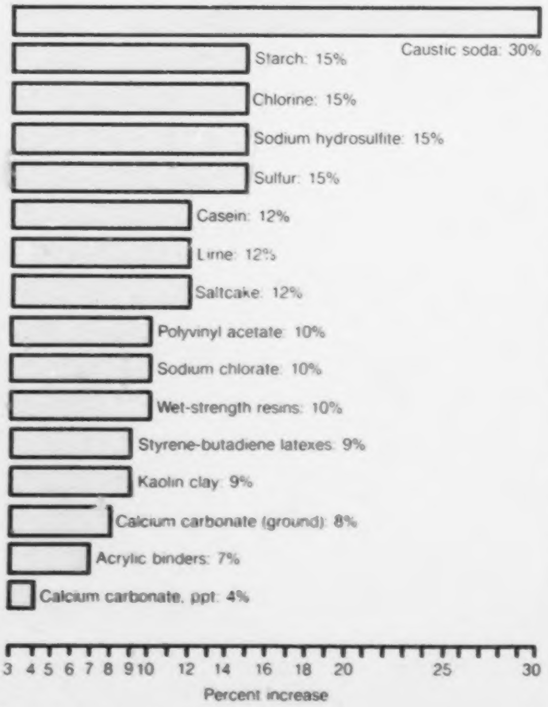
Several of the smaller-quantity pulp and paper chemicals are apparently poised on the verge of substantial increases in demand. Hydrogen peroxide (H_2O_2) demand, for example, could grow as much as 10%/year for the next four or five years, if new applications continue their strong demand. Geothermal energy on the West Coast and in-situ uranium mining are other new areas of potentially good growth for H_2O_2.

Some of the larger-volume commodity chemicals used in the paper industry are not in as short supply as they were in 1980. Saltcake, for example, is readily available, with mills in certain parts of the country having the choice of buying either domestic product or sulfate imported from Canada. The annual growth rate in sodium chlorate demand is expected to increase above the current level of about 7% as the move to chlorine dioxide by many mills continues.

The continuing move to TMP pulping will help to increase demand for bleaching chemicals such as sodium hydrosulfite (as well as H_2O_2), either as a proprietary blend or via the borohydride route.

Most of the miscellaneous chemicals used by the pulp and paper industry are expected to be in adequate supply this year, but prices continue to rise between 7% and 12%, under pressure of raw material costs.

Figure 2. **Projected price increases for major chemicals in 1982**



Definitions

Availability terms are defined as follows:

Very tight—On allocation or demand significantly greater than supply

Tight—Demand slightly greater than supply

Market—Supply and demand in balance, or excess capacity available

Calcium carbonate

Uses: About 85% of the calcium carbonate ($CaCO_3$) consumed by the paper industry is used in coating paper and board. The balance is employed as a filler. Precipitated $CaCO_3$ grades are used in about 70% of the applications, but ground natural $CaCO_3$ continues to find increased usage as finer grades are introduced.

Demand: Estimated consumption by the paper industry for 1981 is expected to be in the neighborhood of 140,000 tons, compared with 133,000 tons in 1980. Other major applications are: plastics, coatings, and refractories. Usage in the nonpaper-coating areas is substantially greater, but mainly comprises the less-costly coarser-ground material.

Sources: Producers are listed in the P&P Buyers Guide 1982, "Register of coating and filler pigments."

Availability: 1981, market; 1980, market; 1979, market.

Pricing: Precipitated: 1981—$95-$140/ton, f.o.b. works; 1980, $105-$135/ton; 1979, $98-$123/ton; 1978, $95-$133/ton. Ground, medium: 1981, $95-$100/ton, f.o.b. works; 1980, $90-$95/ton; 1979, $82-$83/ton; 1978, $66-$76/ton. (For further information see P&P, May 1981, p. 155.)

Forecast: Ultrafine ground calcium carbonates are finding increased usage as a coating pigment and are replacing some titanium dioxide as well as precipitated grades. The price of precipitated carbonate only rose about 3% to 4% this year and is forecast to increase the same in 1982. Ground $CaCO_3$, on the other hand, increased about 5% in price and is expected to go up about 8% next year.

Caustic soda

Uses: Most of the caustic (sodium hydroxide) consumed by the pulp and paper industry is used by kraft and bleached sulfite mills, mainly for caustic extraction. Kraft and semichemical (NSSC) mills also employ some caustic for sodium oxide makeup. Organic and inorganic chemicals production, textiles, and aluminum processing are other important uses.

Demand: Pulp mills account for about 17% of the total demand of some 13.5 million tons. Organic and inorganic chemicals together use more than 50% of the total, while textiles and aluminum processing each employ about 6%.

Sources: Caustic soda is a coproduct of chlorine production. See chlorine profile for major producers.

Availability: 1981, very tight to tight; 1980, very tight; 1979, market; 1978, market.

Pricing: 1981, $270-$320/ton, 50% solution, f.o.b. works, freight-equalized; 1980, $167-$200/ton; 1979, $130-$160/ton; 1978, $160-$170/ton.

Forecast: The slight easing in caustic supply problems that occured in the third quarter was directly attributable to the increased demand for chlorine, sparked by improvements in the housing and automotive sectors. The tight market will ease next year, provided that the predictions for a substantial upsurge in the housing industry come to pass. By the end of the year, close to 110,000 tons of caustic will have been added to the merchant market as a result of BF Goodrich's new chloralkali and ethylene dichloride (EDC) facility in Convent, La. Vulcan, itself, is expanding the Wichita, Kan., plant by 40% by adding a new 200-tpd chlorine unit, scheduled for onstream operation in mid-1983. A portion of the chlorine will be employed captively to produce high-quality hydrochloric acid (HCl capacity is 70,000 tpy). Alcoa's refurbished 398-tpd caustic plant is slated for startup in Texas early next year.

Chlorine

Uses: The major use for chlorine in the pulp and paper industry is as a bleaching agent in both kraft and sulfite pulp mills. Small quantities of chlorine are also employed for on-site manufacture of calcium or sodium hypochlorite used with chemical or mechanical pulps.

Demand: Between 12% and 13% of total chlorine demand is purchased by the pulp and paper industry. In 1981 it is estimated that between 12 and 13 million tons will be consumed domestically in all applications, compared with the 11 to 12 million tons in 1980. Other major outlets include ethylene dichloride (EDC)—the intermediate for vinyl chloride monomer (VCM) manufacture—both inorganic and organic chemicals, and municipal and industrial water treatment. Manufacture of EDC accounts for about 21% of the total.

Sources: The advent of Convent Chemical on the chloralkali scene will be balanced somewhat by the withdrawal of BASF Wyandotte from chlorine/caustic manufacture (in 1983). This will leave approximately 25 chloralkali producers in the country making chlorine and caustic together by the electrolytic reduction of brine. Major producers include Dow Chemical, PPG Industries, Diamond Shamrock, Hooker Chemicals, Olin, Georgia-Pacific, Vulcan Materials, and Pennwalt.

Availability: 1981, market; 1980, market; 1979, tight to very tight; 1978, market.

Pricing: 1981, $145/ton, f.o.b. works, freight-equalized; 1980, $145/ton; 1979, $135-$150/ton; 1978, $135-$145/ton. Although the list price for chlorine has been at the $145/ton level since last year (and is not expected to be changed until 1982), actual selling prices have ranged from $80-$110/ton. Most of the industry instituted a $10/ton boost on the off-list price, slated to take effect on July 1. However, the increase did not hold, either due to the fact that some producers rescinded the increase or because of the issuing of a temporary competitive allowance (TCA) of the same magnitude. Recently, another attempt was made to hike the off-list prices, when at least two of the major producers announced a $15/ton and $20/ton hike (Dow Chemical and Diamond Shamrock, respectively) to take effect on October 1. Unless the hoped for recovery in the chlorine market is realized, it is likely this second attempt at a price hike will also fail.

Forecast: Chlorine demand was expected to strengthen in the second half of the year, after a depressed first half, but the recovery has been slower than anticipated. In the longer term, a more buoyant economy, together with increased demand for PVC—the key downstream product (via EDC) for chlorine—will allow the chloralkali producers to increase their operating rates. However, pulp and paper industry usage of chlorine may well decrease under pressure of continued ClO_2 substitution.

Hydrogen peroxide

Uses: Traditionally used in the pulp and paper industry, primarily as a bleaching agent for chemical and mechanical pulps, hydrogen peroxide (H_2O_2) is finding increased applications in the deinking of recycled newspaper stock.

Demand: Out of a total consumption last year of close to 123,000 tons, almost 18% (22,000 tons) was consumed by the pulp and paper industry. In 1981, usage by the industry should be in the neighborhood of 23,500 tons. The largest end-use for the peroxide is as a chemical intermediate; others include textiles, water and waste treatment, and mining application.

Sources: There are now four producers in the U.S., since Shell closed its Norco, La., plant in the first quarter of 1980. E.I. duPont and FMC expanded their facilities in 1980, while Interox America brought its grassroots plant in Deer Park, Texas, on-stream in late 1979. PPG operates a small facility in Ohio.

Availability: 1981, market; 1980, market; 1979, market; 1978, market.

Pricing: 1981, 35.6¢-39.5¢/lb, 70% solution, f.o.b. producing point, freight equalized; 1980, 35.5¢-36.5¢/lb; 1979, 32.5¢/lb; 1978, 28¢/lb.

Forecast: H_2O_2 demand is expected to increase 8% to 10% annually through the middle of the decade. Increased usage of recycled newsprint will result in greater demand for the peroxide in deinking processes, while in-situ uranium mining and treatment of waste steam from West Coast geothermal energy production are becoming significant end-use areas, already accounting for at least 5000 tpy each.

Kaolin clay

Uses: Kaolin clays are employed in a wide range of paper and board grades as both fillers and coating pigments. The latter application accounts for about 54% of industry usage.

Demand: An estimated 3 million tons of kaolin is used annually by the paper industry, about 75% of total kaolin consumption. Approximate usage by grades: Nos. 1 and 2, 24%; water-washed, 22%; Nos. 3 and 4, 16%; delaminated, 13%; high-brightness and air-float, 10% each; and other, 5%. The ceramics industry accounts for about 20% of total consumption, while miscellaneous applications (paints and rubber, for example) hold the remaining 5%.

Sources: Producers are listed in P&P's Buyers Guide 1982, "Register of coating and filler pigments."

Availability: 1981, market; 1980, market; 1979, market to tight. Demand is generally high for high-quality grades, particularly water-washed clays.

Pricing: Premium No. 1 coating: 1981, $130/ton, f.o.b. Georgia; 1980, $118/ton; 1979, $108/ton; 1978, $98/ton. Water-washed No. 1 coating: 1981, $91.50/ton (same basis); 1980, $84/ton; 1979, $76/ton; 1978, $61.50/ton. Dry-ground filler grade: 1981, $56/ton (same basis); 1980, $51/ton; 1979, $35-$44/ton; 1978, $30-$35/ton. (For further information, see P&P, May 1981, p. 155.)

Forecast: The coated paper market has been operating well to date with coated two-side grade production up 7.2% through August. It is not forecast to drop significantly through the rest of 1981 and into 1982, thus keeping demand for kaolin grades at a level comparable to last year.

Lime

Uses: The kraft mill operator requires a low-cost alkali to causticize the sodium carbonate in the green liquor. Lime, being the cheapest alkali available (between 2¢-3¢/lb), is therefore basic to the soda/lime route to free caustic. Kraft mills produce reburned lime on-site.

Demand: The U.S. pulp and paper industry accounts for about 5% of total lime consumption, which last year was about 19.5 million tons, down from the estimated 21 million tons required in 1979. Continuing lag in the construction and steel industries in 1981 will probably result in little growth, if any, for lime consumption. Major lime end uses: steel (37%); environmental applications (20%); chemicals, and sugar refining.

Sources: Included among the major manufacturers of lime, produced mainly from calcite ($CaCO_3$) or dolomite ($CaCO_3MgCO_3$), are Allied, Bethlehem Steel, Diamond Shamrock, Flintkote, Marblehead Lime, Martin Marietta Chems, Mississippi Lime, Pfizer, Steetley Industries, and U.S. Gypsum. Steetley purchased the Tacoma, Wash., plant of Domtar Industries earlier this year.

Availability: 1981, market; 1980, market; 1979, tight in eastern U.S., market in West; 1978, market to tight.

Pricing: Quicklime: 1981, $51.63/ton, f.o.b. plant; 1980, $46.10/ton; 1979, $41.16/ton; 1978, $36.75/ton.

Forecast: Next year should see some improvements in construction and steel which will most likely bring demand back close to the level prevailing in 1979.

Polyvinyl alcohol

Uses: Polyvinyl alcohol (PVA) is employed by the paper industry primarily as a surface size for printing and writing grades, but is also used to some extent in paper coatings.

Demand: About 12% of the total PVA produced is consumed by the paper industry. Production in 1981 is expected to reach the 127-million-lb level (excluding that required in the manufacture of polyvinyl butyral (PVB), down about 9.5% from the estimated 140.5 million lb produced last year. (Output in 1980 was also under that for the previous year by about 5%). Imports are currently running at a 23-million-lb/year rate, slightly under the 21 million lb reported for 1980. The largest end-use for PVA is by the textile industry (warp sizing), while adhesives and emulsifiers account for 25% and 12%, respectively.

Sources: PVA, derived from the hydrolysis of polyvinyl acetate, is produced domestically by three firms: Air Products & Chemicals, duPont, and Monsanto. Air Products makes both partially and fully hydrolyzed grades, duPont makes only the fully hydrolyzed product, while Monsanto produces only partially hydrolyzed PVA. However, duPont has announced it will expand capacity at its Houston, Texas, plant by 50% in 1984 and will also produce partially hydrolyzed PVA at that time.

Availability: 1981, market; 1980, market; 1979, market; 1978, market.

Pricing: 1981, $1.00-$1.05/lb, f.o.b. plant; 1980, 86.5¢-91.5¢/lb; 1979, 77.5¢/lb; 1978, 69.5¢/lb.

Forecast: The PVA market is expected to grow an average of 6.5%/year to mid-decade, excluding PVB uses. However, an annual growth of only 4% is predicted, if PVB demand is included.

Saltcake

Uses: Saltcake (sodium sulfate) is the main source of makeup sodium and sulfur values in kraft mills.

Demand: Kraft pulp mills use slightly more than 50% of the estimated 1.3 million tons of sodium sulfate produced annually. Besides small quantities used as a textile mordant and in animal feeds, the balance of the sulfate produced is mainly consumed by the detergent and glass industries.

Sources: Equal quantities of sodium sulfate are produced from both natural deposits or as a byproduct in the manufacture of rayon, sodium bichromate, and hydrochloric acid. The product grade is dependent on the process employed. Major producers include Allied, Akzona, Avtex, Climax Chemical, Diamond Shamrock, Great Salt Lake, Kerr-McGee, Koppers, Morton, and Ozark-Mahoning. In addition to domestic supply, significant quantities of sulfate are imported from the Canadian Prairies. Shipments from Canada in 1981 are expected to be only slightly ahead of last year, when imports were 25% higher than in 1979.

Availability: 1981, market; 1980, tight to market; 1979, market to tight; 1978, market.

Pricing: 1981, $68-$79/ton, f.o.b. plant; 1980, $60-$68/ton; 1979, $47-$52/ton; 1978, $35-$45/ton. Prices are regional, being slightly lower on the West Coast.

Forecast: Demand for saltcake has dropped under pressure of the economic downturn. In the immediate future, it is expected that there will be increased requirements for saltcake as mill operating rates go up. However, over the long term, usage by the pulp mills will be directly dependent on the extent to which mills opt for chlorine dioxide replacement in the first bleaching stage. Mills operating a ClO_2 generator can use the sodium and sulfur values contained in the effluent to replace purchased saltcake.

Sodium chlorate

Uses: Most of the sodium chlorate produced is employed by pulp mills to generate chlorine dioxide (ClO_2) on-site.

Demand: In 1980, about 90% of the estimated 500,000 tons of sodium chlorate produced was used to generate ClO_2. Uranium processing accounted for 5%, while chlorate salt manufacture and agricultural applications took the remaining 5%.

Sources: Principal U.S. producers of sodium chlorate—derived from the electrolysis of an acidified sodium chloride solution—include ERCO Industries, Hooker Chemical, Huron Chemicals, Georgia-Pacific, Kerr-McGee, Olin, Pacific Engineering, and Pennwalt.

Availability: 1981, market; 1980, market; 1979, market; 1978, tight.

Pricing: 1981, $375/ton, f.o.b. works, freight equalized (Northeast); 1980, $345-$375/ton; 1979, $335-$345/ton; 1978, $345/ton. Prices in the southern states were slightly higher in 1981, ranging from $405-$420/ton. A $20/ton hike slated for the beginning of the third quarter was subsequently rescinded, but it is anticipated that there will be another attempt to institute the increase in the fourth quarter.

Forecast: The swing to chlorine dioxide bleaching is expected to significantly increase the 7%/year growth in sodium chlorate demand. Olin and Huron Chemical have formed a joint-venture company—HO Process—to provide on-site bleach chemical plants at pulp mills in the U.S. The first on-site facility is targeted for completion next year.

Sodium hydrosulfite

Uses: Sodium hydrosulfite is used as a bleaching agent for mechanical and deinked pulps, either as a proprietary blend or from in-situ generation at the mill from sodium borohydride (Borol).

Demand: U.S. consumption this year is estimated at about 55,000 tons, excluding in-situ hydrosulfite produced via the Borol route. 20% of this total was accounted for by pulp bleaching. The largest end-use for sodium hydrosulfite is in vat dyeing (60%), while miscellaneous applications and exports each hold about 10% of the total.

Sources: There are three producers of sodium hydrosulfite—Olin, Royce Chemical, and Virginia Chemicals. Borol is produced by Thiokol's Ventron Div.

Availability: 1981, market; 1980, market; 1979, market; 1978, market.

Pricing: 1981, 52¢/lb (proprietary blends), f.o.b. producing point; 1980, 49¢/lb; 1979, $47¢/lb; 1978, 45.5¢/lb.

Forecast: The continuing growth in TMP pulping and newsprint recycling will help to increase the demand for hydrosulfite in the pulp and paper industry. However, the proprietary blends will continue to meet competition from Borol, although in some cases mills are beginning to use a combination of the two brighteners.

Starch

Uses: Corn, wheat, tapioca, or potato starches are the workhorse binders for the coating mills, and are also employed as surface sizes and internal additives. Starch is employed, as well, in adhesive applications for corrugated containers.

Demand: Total consumption this year is estimated at between 4 and 5 billion lb; 3 billion lb will be used for paper and board. An estimated 2.8 billion lb were used by the paper industry in 1980. Other major end-uses: food, brewing, and textiles.

Sources: 90% of the starch used by the paper industry is cornstarch. A listing of producers appears in P&P, Buyers Guide 1981, pp. 32-43.

Availability: Unmodified, 1981, market; 1980, market; 1979, market. Modified, 1981, tight to market; 1980, tight, 1979, tight to market.

Pricing: Unmodified, 1981, $12.25/100 lb, f.o.b. plant; 1980, $9.50-$10.50/100 lb; 1979, $9-$10/100 lb; 1978, $8/100 lb. Modified starch prices vary for each grade, but generally follow price trends of unmodified starch.

Forecast: Unmodified starch markets may conceivably become tighter as the demand for high-fructose corn syrup (HFCS) continues to increase, particularly by the soft drink industry. A couple of the cornstarch producers have recently expanded their HFCS capacities. A.E. Staley increased its HFCS capacity from 1.3 to 2.3 billion lb/year, while Amalgamaize (a joint venture of American Maize and Amalgamated Sugar) brought onstream in mid-summer a 55% expansion at its Alabama plant, bringing HFCS capacity to 55 million lb/year. Last year, CPC closed a plant in Texas and converted an Illinois facility to gasohol; but the loss in starch capacity was offset by expansions at Cargill and National Starch which totalled some 80 million lb/year. There should be no shortage of corn, since a record crop has been reported for this year. This large corn crop will help keep price increases below the 20% rise experienced in 1980; and a 15% hike for 1981 is forecast.

Styrene-butadiene latex

Uses: The bulk (about 90%) of the styrene-butadiene (SB) latex employed by the paper industry is used as a coating binder, the remaining 10% being for paper saturation (wallpaper, for example).

Demand: About 38% of the estimated 585 million lb of SB latex consumed in the U.S. last year was used by the paper industry. The major end application (50%) is in carpetbacking and integral foam. The remaining 12% is divided among other textile applications and adhesives.

Sources: At least two-thirds of the estimated 915 million lb of annual capacity in the U.S. is held by three major suppliers: Dow Chemical, Reichhold, and General Tire (in descending order of nameplate). A host of smaller firms make less than 100 lb/year. A complete listing of producers appears in P&P Buyers Guide 1981, pp. 32-43.

Availability: 1981, market; 1980, market; 1979, market; 1978, market.

Pricing: 1981, 65¢-75¢/lb, delivered; 1980, 59¢/lb; 1979, 53¢/lb; 1978, 40¢-43¢/lb.

Forecast: In the last couple of years, the rising costs of petrochemical feedstocks have hampered the efforts by the SB latex compounders to replace part or all of the starch binder used in papercoating. Both styrene and butadiene (the precursors for SB latex) have risen sharply in price since the beginning of last year, although there are signs that the price of styrene monomer is beginning to move downwards. At the end of the third quarter, styrene prices were reportedly being discounted at least 3¢/lb. Nevertheless, the increasing demand for lead-free gasoline will put additional pressures on the supply of aromatics such as benzene, one of the precursors for styrene monomer.

Sulfur

Uses: The bulk of the sulfur used by the pulp and paper industry is purchased by sulfite pulp mills, although some quantities are used directly in kraft pulp mills.

Demand: Pulp mills consume only a small fraction of the 10.8 million long tons (12 million short tons) of sulfur expected to be consumed in the U.S. this year. By far, the bulk of the sulfur purchased is for sulfuric acid and fertilizer production.

Sources: Between 53% to 55% of the elemental sulfur produced in the U.S. is via the Frasch route, the balance coming from refineries and sour natural gas production. Major Frasch producers are: Duval, Freeport Sulfur, and Texasgulf. More than 53 firms recover sulfur, the majors being Atlantic Richfield, Exxon, Getty, Mobil, Standard, Texaco, and Union Oil.

Availability: 1981, tight; 1980, tight; 1979, very tight; 1978, market to tight.

Pricing: 1981, $133.50/long ton, crude, bright, f.o.b. Gulf Coast ports; 1980, $105-$121/long ton; 1979,

$71.75/long ton; 1978, $62.50/long ton. U.S.-recovered sulfur is quoted $15-$20/ton below Frasch levels. Currently, Canadian recovered sulfur is being listed at between US$75-$80/long ton, f.o.b. Alberta producing points.

Forecast: New capacity that came on-stream in the 1980-81 period has slightly eased the tight sulfur supply situation, which had been partially relieved by weak summer demand from the fertilizer industry. Duval and Freeport added 373,000 long tons of capacity last year to their Frasch operations, while Mobil, Pursue Gas Processing & Petrochemical, and Shell increased their recovered capacity by 751,000 long tons. This year, an additional 152,000 long tons of capacity came on-stream in the refinery and natural gas sectors. Prices for both recovered and Frasch sulfur are expected to increase at least 15% in 1982.

Titanium dioxide

Uses: Both rutile and anatase grades of titanium dioxide (TiO_2) are employed by the fine paper and board mills, as a filler and in coatings.

Demand: The paper industry will consume slightly more than 360 million lb of TiO_2 this year, with anatase grade comprising 75% of this. In 1980, industry consumption was an estimated 354 million lb. The U.S. consumes a total of about 810,000 tpy. The largest end-use being paints (51%), while plastics applications accounted for 12%. Paper and paperboard applications comprised 23% of the total.

Sources: About 75% of the TiO_2 produced in the U.S. is via the chloride route, the remaining 25% employing the sulfate process. Producers are listed in P&P Buyers Guide 1982, "Register of coating and filler pigments."

Availability: 1981, anatase/rutile, market; 1980, anatase/rutile, market; 1979, anatase, market; rutile, tight.

Pricing: 1981, anatase, 58¢-70¢/lb, delivered; rutile, 63¢-75¢/lb; 1980, anatase and rutile, 57¢/lb; 1979, anatase, 53¢/lb; rutile, 59¢/lb; 1978, anatase, 46¢/lb; rutile, 52¢/lb.

Forecast: TiO_2 demand has remained relatively firm, even though some of its major markets are weathering a severe recession in the construction industries. Paper and board demand is good and should improve in 1982. TiO_2 is under pressure from other replacement pigments, but these are not yet a serious threat to its position.

Other major chemicals

Acrylic binders: Supplies of acrylic coating binders are adequate this year, as was the case in 1980. Alkali swellable copolymer prices have gone up to 72.5¢/lb, f.o.b. producing point, and are expected to increase another 7% in 1982.

Alum: There is no shortage of aluminum sulfate this year, although the supply/demand balance has tightened slightly. A $10/ton boost was instituted in mid-summer, bringing the solution alum price to $133/ton in the North and $126/ton in the southern states. Further increases are anticipated in 1982, under pressure of rising raw material costs for sulfuric acid and alumina.

Casein: The price of industrial-grade casein has not risen since last year; it remains at $1.26/lb. It is, however, expected that 1982 will see at least a 12% increase.

Polyethylene: Extrusion-coating,low-density polyethylene was selling at the end of the third quarter for 45¢/lb, hoppercars, f.o.b. works, freight allowed. The increase from mid-year 1980 was only between 3% and 4%, but it is anticipated that next year's price increase will be between 6% and 7%.

Polyvinyl acetates: Polyvinyl acetate emulsions used by the paper industry are in good supply. However, prices are directly influenced by the oil sector since, like other synthetic binders, PVA_C is petrochemically based and should experience increases of at least 10% in 1982.

Rosin sizes: Although supplies of tall-oil rosin were tight early this year, sales have strengthened; prices rose at the beginning of the second quarter from 32¢/lb to 38¢-41¢/lb. Rosin demand by the paper industry has been reduced by the penetration of synthetic sizes, although inks, adhesives, and coatings are maintaining strong demand for the rosin.

Soda ash: Solvay-process soda ash must compete with natural trona shipped from Wyoming. Costs of both mining and transport of trona are sensititve to energy prices, though the synthetic product is even more energy-intensive. Both types have therefore been experiencing escalating prices. The second boost this year, effective July 1, has brought natural trona to $92/ton, bulk, f.o.b. Wyoming, while Allied's product is now selling at $132/ton, bulk, f.o.b. Syracuse, N.Y. Both types rose $6/ton in the latest round of increases.

Wet-strength resins: Also petrochemically based, urea-formaldehyde and melamine-formaldehyde resins continue to escalate in price as the price of methanol continues to rise. (Methanol is the precursor for formaldehyde.) At least a 10% boost is expected again for next year.

Survey of chemical supply for the pulp and paper industry in Canada

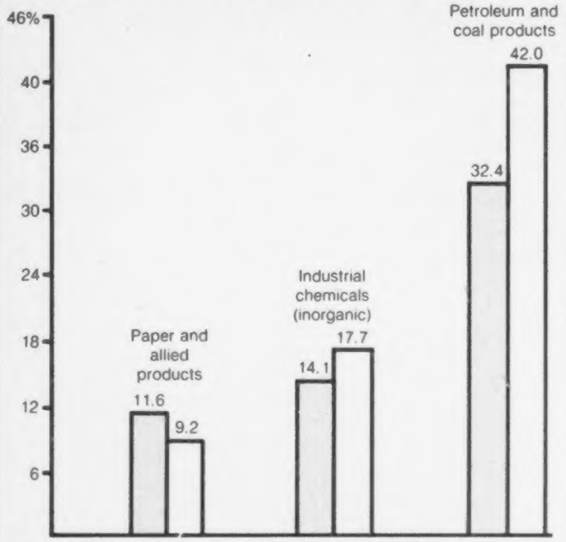
☐ Prices in Canada have also been escalating, under pressure from double-digit inflation, compared with last year (see Figure 3). Nevertheless, the percent increase in prices for pulp and paper products for the January-July period was actually less than was the case at the end of the first quarter. The most significant development, however, is the huge jump in the petroleum and coal products index, which will lead to substantial price increases in petrochemical-base products.

Specifically affected will be the synthetic binders and sizes, such as styrene-butadiene latexes and acrylic and polyvinyl acetate emulsions. Wet-strength additives (such as polyamide-epichlorohydrin) and surface sizes are also based on petrochemical precursors, as are dry-strength additives like polyacrylamides.

The new agreement signed in September between the Alberta and federal governments will considerably exacerbate the situation over the next five years. Beginning January 1, 1982, the wellhead price of old oil will rise to $23.50/bbl (from $19.75), but new oil (oil discovered after December 1, 1981) will jump almost 150% from the same base to $49.52/bbl. Prices will continue to rise at least $4.50/bbl/year for old oil, while the new-oil wellhead price is to reach $77.48/bbl by July 1, 1986.

However, costs of most chemicals (whether petrochemical base or not) will continue to rise next year, led by the expected 30% hike in caustic prices (see Figure 4). Over the past year or so, the caustic market has experienced shortages which resulted in the major producers placing their customers on allocation at the beginning of 1981. With demand down somewhat because of the disruptions in the western mills, allocation percentages may be eased by year-end. The chloralkali producers are still hampered by lack of chlorine markets.

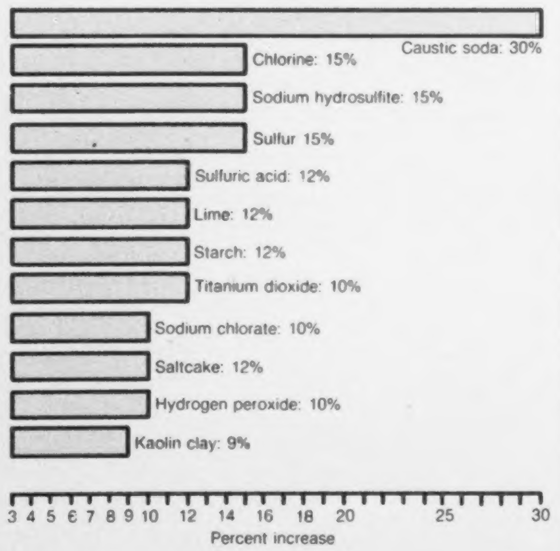
Figure 3. **Canadian price increases for 1981***



* Shaded column shows price increases for first three months of 1981; unshaded data is for first seven months of this year.

Source: Statistics Canada, Industrial Prices Div.

Figure 4. **Projected price increases for major chemicals in 1982**



Sulfur is the other commodity besides caustic that has been in a tight supply situation, which should ease somewhat this year. Exports to the U.S. have continued to grow, reaching 1.58 million tons in 1980, up from 1.4 million tons in the previous year. For 1981, sulfur shipments to the U.S. are estimated to be 1.65 million tons.

Another chemical that has been exhibiting good growth over the past couple of years—and is expected to maintain that rate over the foreseeable future—is sodium chlorate. Domestic capacity is growing by leaps and bounds, a substantial portion of which is earmarked for export shipments in the northeast U.S. Exports of chlorate have not been that large for the past two or three years, only about 38,500 tons going south in 1980. The same amount is expected to be shipped in 1981. Without the additional capacity (40,000 tons) coming on-stream in 1983 in the east, exports for mid-decade have been pegged at about 44,000 tons.

Total pulp capacity is expected to increase at least 10% by 1983, while newsprint capacity is predicted to grow by 15% during the same time. However, since U.S. newsprint capacity is forecast to increase 20% in the 1980-83 period, shipments of Canadian newsprint across the border will begin to slow down. Operating rates of the Canadian mills have already dropped slightly, averaging 95% for the first seven months (before the B.C. strike) compared with 97% in 1979.

Aluminum sulfate

Uses: The Canadian pulp and paper industry consumes about 60% of the total aluminum sulfate produced in the country. Slightly better than 50% of the alum going to the mills is employed in the precipitation of rosin size, the balance being used for pitch control and process water treatment.

Demand: In 1980, an estimated 55,000 tons of alum were used for internal paper sizing; this will increase slightly in 1981 to 56,000 tons. Total alum consumption in 1980 was an estimated 178,500 tons and is expected to rise slightly to 183,000 tons for 1981. Municipal water and sewage treatment account for 30% of total alum usage, the balance going into pigments, cellulose insulation, and other miscellaneous applications.

Sources: There are two major Canadian alum producers—Alcan Smelters & Chemicals and Allied Chemical Canada—and several smaller operations in western Canada, the largest being Inland Chemicals, a C-I-L subsidiary.

Availability: 1981, market; 1980, market; 1979, market to tight.

Pricing: 1981, $111-$132/metric ton ($100.70-$119.75/short ton), liquid, f.o.b. Valleyfield, Que.; 1980, $86-$111/ton; 1979, $79-$86/ton.

Forecast: There was only one price hike this year (19% in the March/April period) for aluminum sulfate. This contrasted sharply with alum's price performance last year when two boosts within a three-month period increased prices about 27.5%. However, further price increases this year are unlikely. Demand for alum in both the pulp and paper and the water treatment sectors has been growing only 2% to 3%/year over the past couple of years. Strikes last year at Abitibi and Domtar cut alum consumption. In addition, the use of more TMP in newsprint furnish has allowed some mills to cut back on their alum needs.

Caustic soda

Uses: Pulp mills, which consume the largest share of the caustic soda produced, employ the sodium hydroxide in the extraction stages of kraft bleach plants, for hypochlorite makeup and in sulfite pulping.

Demand: The pulp mills were expected to use about 1.1 million tons of caustic in 1981, compared with the slightly more than 1 million tons employed last year. However, the six-week strike in western Canada will result in lower consumption. The pulp and paper industry normally accounts for almost 65% of the total caustic consumed. The next-largest end uses are in the production of propylene oxide and alumina, which take about 6.5% each. Other uses include detergents and cleaners, organic and inorganic chemicals, petroleum refining, food and textile processing, and cellulose film.

Sources: Caustic, a coproduct of chlorine production, is made by about nine firms in Canada. The major producers are listed in the chlorine section.

Availability: 1981, very tight to tight; 1980, very tight, 1979, tight; 1978, tight.

Pricing: 1981, $293-$381*/ton, 50% solution, bulk, f.o.b. works, freight equalized; 1980, $195-$293/ton; 1979, $183-$195/ton; 1978, $175-$183/ton. (*Effective Oct. 1; no further hikes expected in 1981.)

Forecast: The supply of caustic is forecast to tighten up again next year. It is possible that the increased price of caustic, compared with the relatively steady price of soda ash, might lead to a switch back to the carbonate by some of the sulfite mills who opted for caustic a couple of years ago. But, demand for caustic by kraft mill bleach plants will continue to account for most consumption increase over the next three or four years.

Chlorine

Uses: Chlorine's major use is as a bleaching agent in kraft and sulfite pulp mills, although the growing trend to chlorine-dioxide substitution in the first bleaching stage is threatening its dominant position in the bleach plant.

Demand: The percentage share of the Canadian pulp and paper industry's use of chlorine has declined over the last three years. From a high of 60% in 1978, it dropped to about 45% of the estimated 1.3 million tons domestic demand in 1980. For 1981, the industry's share was predicted to decrease slightly to 43%, but it could be somewhat less because of the decreased consumption on the west coast due to the strike. The next-largest end-use for chlorine is in the production of ethylene dichloride (EDC), the precursor of polyvinyl chloride (PVC), whose share has grown substantially over the last two years from 15% to about 31.5% in 1980. Organic and inorganic chemicals account for most of the balance.

Sources: Chlorine is produced along with caustic by the electrolytic reduction of brine, an energy-intensive process. The major chloralkali producers include C-I-L, Canadian Occidental Petroleum, Dow Chemical Canada, FMC Chemicals, and Stanchem.

Availability: 1981, market; 1980, market; 1979, tight; 1978, tight.

Pricing: 1981, $225-$254*/ton, bulk, f.o.b. works; 1980, $195-$225/ton; 1979, $163-$195/ton; 1978, $145-$165/ton. (*Effective Oct. 1.)

Forecast: The inroads of ClO_2 in the first bleaching stage will, no doubt, increase over the next several years. However, the amount of chlorine displaced may change. Thus, although overall chlorine demand may increase an average of 4%/year to mid-decade, usage by the mills could grow modestly.

Hydrogen peroxide

Uses: Hydrogen peroxide (H_2O_2) is employed by the pulp and paper industry as a bleaching agent for mechanical and chemical pulps. Other uses include textile bleaching and water treatment. A new use in a pulp mill is currently being tested and involves the addition of small quantities to the first extraction stage to reduce the color of the bleach plant effluent.

Demand: In 1979, the 3400 tons of H_2O_2 used for pulp bleaching comprised 60% of the total peroxide consumption. This had grown to 5000 tons and 68.5% of the total last year. It is estimated that about 5700 tons will be employed by the mills in 1981. Textile applications in 1980 accounted for 10.5% of total usage, while water treatment took about 6%. The balance went into miscellaneous end uses. Since C-I-L and DuPont Canada closed their small domestic plants several years ago, all peroxide consumed in Canada has been imported, mostly from the U.S.

Sources: The major importers are C-I-L and DuPont, which bring in product from FMC and E.I. DuPont respectively. Interox America also ships in some peroxide on a direct basis, and various distributors import from European sources.

Availability: 1981, market; 1980, market to tight; 1979, market; 1978, market.

Pricing: 1981, 38¢-42¢/lb, bulk, 50% solution, f.o.b. Toronto; 1980, 35¢-38¢/lb; 1979, 33¢-35¢/lb; 1978, 29¢-33¢/lb.

Forecast: The fortunes of hydrogen peroxide in the pulp and paper industry have been reversed since the mid-70s. Due to more use of TMP, H_2O_2 usage has been growing at an average annual rate of more than 50% from 1977-80. It is expected that over the next four to five years the annual growth in consumption will average about 11%/year.

Hydrosulfites, borohydride solution

Uses: Practically all newsprint mills bleach groundwood with hydrosulfite. An alternative to purchased sodium hydrosulfite (either unblended or as proprietary blends), Borol is employed by many mills to generate sodium hydrosulfite in situ.

Demand: In 1980, the pulp and paper industry used an estimated 9500 tons of sodium hydrosulfite as such, and an additional 11,000 tons of Borol (on a 12% active borohydride basis). The other end use for sodium hydrosulfite, vat dyeing of cotton, accounted for about 12% of the total consumed.

Sources: No sodium hydrosulfite has been produced in Canada for several years. VirChem of Canada imports blended hydrosulfites from its U.S. parent, Virginia Chemicals (recently acquired by Celanese), while various distributors bring in product from Europe. Borol is shipped in exclusively by the Ventron Div. of Thiokol.

Availability: Hydrosulfite blends: 1981, market; 1980, market; 1979, market. Borol: 1981, market; 1980, market; 1979, market.

Pricing: Blended: 1981, 59¢-64¢/lb, delivered, eastern Canada; 1980, 51.4¢/lb; 1979, 50.5¢/lb. Nonblended: 1981, 66.4¢-71.5¢/lb; 1980, 56¢-66.4¢/lb; 1979, 47.5¢-56¢/lb.

Forecast: Higher brightness-level requirements and the growing acceptance of TMP will result in greater usage of both sodium hydrosulfite and borohydride. Sodium hydrosulfite demand is expected to increase about 5%/year to mid-decade, while Borol's annual consumption should increase about 10% (on the average) during the same period.

Kaolin clay

Uses: Kaolin clay is used as a filler and in coating paper and board, with 59% consumed in filler applications.

Demand: Total kaolin consumption has been dropping off since 1979, when kaolin imports jumped more than 110,000 tons from the previous year. Last year, 280,500 tons were imported, down somewhat from the 301,500 tons reported for 1979. However, total consumption in 1979 and 1980 was 271,000 and 259,000 tons, respectively, with inventories accounting for the difference. About 87% of total usage is accounted for by the paper industry, the balance going into ceramics, paint and varnish, rubber and linoleum, and miscellaneous applications.

Sources: U.S. suppliers are listed in P&P Buyers Guide 1982, "Register of coating and filler pigments." The balance of the imports comes from English China Clays of the U.K.

Availability: 1981, market; 1980, market; 1979, market to tight.

Pricing: Water-washed No. 1 coating grade: 1981, US$215-$218/ton, f.o.b. Georgia; 1980, $208-$215/ton; 1979, $194-$208/ton. Dry-ground, air-floated, filler grade: 1981, $47-$58/ton (same basis); 1980, $43-$47/ton; 1979, $35-$43/ton.

Forecast: Labor strife last year in eastern Canada resulted in a slight downturn in coating-grade kaolin use with an estimated 91,500 tons consumed. The strikes at some eastern mills continued into the second quarter of this year; and in July, strikes in the British Columbia forest industry occurred. Consumption this year will, therefore, be somewhat less than the 88,000 tons originally predicted at the beginning of the second quarter.

Lime

Uses: 30 kraft mills purchase lime to supply supplementary calcium requirements.

Demand: Pulp mills accounted for 228,000 tons (11%) of the estimated 2 million tons of lime consumed domestically in 1980. Iron and steel mills are the largest consumers and accounted for more than 680,000 tons (31%) last year. In descending order of magnitude, other lime uses include industrial chemicals, uranium recovery, nonferrous smelters, water and sewage treatment, and sugar refining.

Sources: The lime industry is composed of about eight major merchant producers and a host of smaller firms. Some captive operations, such as that of the Steel Co. of Canada, are also large. Based on nameplate capacity, the three major producers are Domtar, Steel Brothers of Canada, and BeachviLime, although the latter firm also has a captive steel company customer. Because of the low cost of the lime, transportation costs—which continue to escalate—have determined that the location of most lime plants be generally close to the consumers.

Availability: 1981, market; 1980, market; 1979, tight to market; 1978, market.

Pricing: Quicklime: 1981, $46-$51/ton, bulk, f.o.b. plant; 1980, $40.98-$46/ton; 1979, $34.98/ton; 1978, $32.48-$34.98/ton.

Forecast: In the last couple of years, the annual growth of the overall lime market dropped to about 2% from the prevailing 4% in the 1977-79 period. Operating rates last year were about 66% based on rated capacity. However, actual capacity is somewhat less than this and the effective operating rate was close to 90%. Despite the drop in annual growth, there should be more than 600,000 tons of nameplate capacity added before the middle of the decade. Steel Brothers, for one, installed a second kiln at its Kamloops, B.C., plant this past summer, which will more than double its previous nameplate capacity of 110,000 tons.

Saltcake

Uses: The largest outlet for sodium sulfate (saltcake) is the kraft pulp mill, followed by usage in the detergent industry.

Demand: Pulp mills account for about 82% of the total domestic demand for sodium sulfate. The detergent industry accounts for some 12% of the total, while the balance (6%) goes into glass, animal feeds, textiles, and other miscellaneous applications. Last year, exports to the U.S. rose to 271,000 tons—up more than 27% from the previous year.

Sources: Unlike the situation in the U.S., byproduct sodium sulfate capacity is only about 11% of the total, the bulk of the sulfate originating in the Glauber's salt deposits in Alberta and Saskatchewan. The major producers include Alberta Sulfate, Francan Minerals, Midwest Chemicals, Ormiston Mining & Smelting, and Saskatchewan Minerals. Sybouts Sodium Sulfate closed its facility last year for economic reasons. In eastern Canada, the two byproduct sulfate producers are Ontario Paper and Courtaulds.

Availability: 1981, market; 1980, market; 1979, market; 1978, market.

Pricing: 1981, $55-$70/ton, bulk saltcake, f.o.b. works; 1980, $50-$55/ton; 1979, $50/ton; 1978, $45-$50/ton.

Forecast: The demand for saltcake by kraft pulp mills has firmed up over the last couple of years. This is in part due to the shortage of caustic, resulting in some mills replacing their caustic requirements with saltcake. However, in the long term, the trend is towards more mills recycling the effluent from their chlorine-dioxide generators, which contain sodium and sulfur values.

Sodium chlorate

Uses: Sodium chlorate is produced mainly for use in chlorine dioxide generators, although it is a powerful oxidizing agent in its own right.

Demand: Last year, about 96% of the total chlorate consumption of 221,000 tons was used by the pulp mills. The balance is accounted for by uranium leaching, which is growing at a much higher rate than usage in the pulp and paper industry. Mill usage of about 230,000 tons had been predicted for 1981, but the western strike will probably reduce that amount by at least 10%.

Sources: The Canadian merchant producers of sodium chlorate are Canadian Occidental, Erco Industries, QueNord Chemicals, and Stanchem. The following firms are captive producers of the chlorate: B.C. Chemicals, Canso Chemicals, Huron Chemicals, St. Anne Chemical, and Saskatoon Chemicals.

Availability: 1981, market; 1980, market; 1979, market; 1978, tight.

Pricing: 1981, $365/ton, f.o.b. works, freight equalized; 1980, $310-$330/ton; 1979, $281-310/ton; 1978, $250-$281/ton.

Forecast: More than 75,000 tons of capacity have come on-stream since 1979. An additional 70,000 tons is slated for next year, while more than 50,000 tons will be coming on-stream between 1983-85. Canadian chlorate capacity by mid-decade should surpass the 460,000-tpy mark.

Starch

Uses: Most of the starch (80%) consumed by the mills is in size press applications; some is used with styrene-butadiene latex systems for coating. A relatively small quantity is accounted for by wet end applications.

Demand: About 21% of the total starch consumed is used by the paper industry, which last year purchased an estimated 72,000 tons. The largest end use for starch is in the production of corn sweeteners, which last year accounted for 51% of total consumption. Other end uses include adhesives for corrugated boxes and miscellaneous applications, food starches, and ore flotation.

Sources: Most of the starch for the paper industry is derived from corn. The major cornstarch producers include Canada Starch, Nacan Products, St. Lawrence Starch, and Zymaize. Industrial Grain Products is a supplier of wheat starch.

Availability: Unmodified: 1981, market; 1980, market; 1979, market. Modified: 1981, market; 1980, market; 1979, market.

Pricing: 1981, native pearl, \$19.25-\$21.50/100-lb bags, f.o.b. Toronto/Montreal; 1980, \$16.45-\$19.25/100 lb; 1979, \$14.45-\$16.45/100 lb; 1978, \$12.60-\$14.59/100 lb. (Deduct \$1/100 lb for bulk shipments.) Unmodified starch prices vary according to grade, and generally follow the price trend for modified starches.

Forecast: Although the corn used by the starch companies is grown domestically, price paid for the grain is strongly influenced by world corn prices. The size of the U.S. corn crop usually determines what the paper mills in Canada pay for their starch. Usage by the mills dropped last year because of the labor stoppages in eastern Canada; usage will decrease again this year because of the B.C. work cut. Over the long-term, purchases by the mills should increase, on the average, about 5%/year.

Sulfur

Uses: The sulfite pulp mills that do not purchase liquid sulfur dioxide burn sulfur to produce gaseous SO_2. Not all the SO_2 is used as makeup for sulfite or bisulfite cooking liquor; some is used for ClO_2 generation and other uses in the bleach plant.

Demand: Since 1978, the pulp and paper industry has relied primarily on domestic byproduct sulfur and, last year, used an estimated 309,000 tons (31%) out of a total sulfur consumption of about 1 million tons. The largest end use for sulfur is sulfuric acid (63.5%), while other applications include carbon disulfide production, rubber vulcanization, and other miscellaneous end uses.

Sources: Sulfur in Canada is recovered either from sour-gas operations or from petroleum refineries. Major producers include Amoco, Acquitaine, Canadian Occidental, Chevron Standard, Gulf Hudson's Bay Oil & Gas, Petrogas Processing, Shell, Texasgulf, and Westcoast Transmission.

Availability: 1981, tight to market; 1980, tight; 1979, tight.

Pricing: 1981, crushed, slate, or molten, \$60-\$75/long ton, f.o.b. producing point; 1980, \$33-\$60/long ton; 1979, \$25-\$30/long ton.

Forecast: The long-term outlook for sulfur usage in the pulp and paper industry is somewhat depressed. Some sulfite mills have switched to methanol (Solvay process) in place of SO_2 in the wake of the sulfur shortages in 1979 and early 1980. Also, additional sulfite mills are becoming obsolete and are under increasing cost pressures, and more may shut down. As a result, sulfur usage will not exceed 265,000 tons by 1983. (In the early 70s, mills were buying as much as 335,000 tpy).

Sulfuric acid

Uses: Sulfuric acid's major use in the kraft pulp mill is in the generation of chlorine dioxide.

Demand: Although pulp mills consume only 8% to 9% of the sulfuric acid consumed in Canada, as a customer group they are the second largest, after phosphoric acid manufacture (61.5%). Other end uses include agriculture chemicals, uranium ore processing, titanium dioxide, mining and smelting, organic chemicals, petroleum refining, soaps and detergents, cellulose film, and viscose rayon.

Sources: Major producers include Allied Chemical, Border Chemical, Cominco, Falconbridge Nickel, Inco Metals, Inland Chemicals, IMC, and Western Cooperative Fertilizers. C-I-L sold its Copper Cliff, Ont., operation to Inco in March of this year. Byproduct acid is made by several firms, and a few companies produce the acid for captive purposes.

Availability: 1981, tight to market; 1980, market to tight; 1979, tight to market; 1978, very tight.

Pricing: 1981, 66° Baume, \$69.31-\$77.79/ton, bulk, f.o.b. producing points, eastern Canada; 1980, \$60.87-\$69.31/ton; 1979, \$52.40/-\$60.87/ton.

Forecast: Over the long term, growth in sulfuric acid demand by the pulp and paper industry should equal the growth in output of bleached softwood market kraft pulp, which is expected to increase at about 4%/year for the 1980-84 period.

Titanium dioxide

Uses: Most of the anatase grade of TiO_2 used by the paper industry is employed by the fine paper mills (90%), the balance being used by paperboard producers.

Demand: The estimated 7200 tons used in 1980 by the paper industry comprised about 10% of the total TiO_2 consumption (over 72,000 tons). The largest use is by the paint industry (60%), while plastic applications accounted for 15%. Other end uses include rubber products and miscellaneous applications.

Sources: There are two domestic producers—NL Chem Canada (formerly called Canadian Titanium Pigments) and Tioxide of Canada—which, between them, have the capacity to produce 79,000 tpy of TiO_2 based on the sulfate process.

Availability: 1981, untreated anatase, market; 1980, market.

Pricing: 1981, \$69-\$74.50/100 lb, untreated anatase, delivered, bags; 1980, \$59-\$69/100 lb; 1979, \$48.50-\$59/100 lb. (Bulk slurry carries a 50¢/100-lb premium.)

Forecast: The longer-term TiO_2 market outlook is for modest growth overall at 2% to 3%/year. Plastics and rubber applications are expected to show better annual growth rates than either paper or paints. There is no real danger of any shortages developing, even though there are no plans for expansions on the agenda by either producer. □

British Columbia leads Canada in mill capacity expansion plans

☐ British Columbia woodpulp capacity will increase by 20.7%, while paper and board capacity is expected to rise 26.8% between 1980 and 1983, according to the just-released Canadian Pulp & Paper Assn. capacity survey. This is double that province's planned national rate of expansion. Canadian TMP will nearly triple in that period due to the current explosion in newsprint. Growth, in most paper grades other than newsprint, however, will be more modest.

Total Canadian pulp capacity will grow by 10.6% in that period. This 2.4-million-metric-tpy hike, to 22.5 million tpy, includes a jump to 3 million tpy (from 1.1 million tpy) in TMP capacity, and a 660,000-tpy market pulp increase to 7.9 million tpy. Bleached softwood kraft market pulp will grow by 8.3% to 5.3 million tpy, with Northwood Pulp & Timber Ltd.'s big Prince George, B.C., expansion the biggest factor. Mechanical market pulp capacity will explode with a 97.9% increase to 475,000 tpy due to a greenfield mill being built in Quesnel, B.C., by Quesnel River Pulp Co.

Dissolving and special alpha grades of market pulp will rise by only 45,000 tpy to 385,000 tpy as the result of modest expansions at three mills. Sulfite grades will fall slightly to 345,000 tpy, cut by the newsprint industry's switch to TMP.

Despite the current softness in hardwood pulp markets, Canadian capacity for bleached hardwood kraft pulp will edge up by 4.1% to 630,000 tpy, while unbleached kraft pulp will remain largely unchanged at 280,000 tpy. Semibleached softwood kraft pulp capacity will drop by 9.1% to 505,000 tpy.

Newsprint manufacturers are adding eight new machines between 1980 and 1983, resulting in a net capacity increase of 785,000 tpy. The installation of six twin-wire formers on existing machines will add another 225,000 tpy of newsprint capacity, while an additional 360,000 tpy will come from other improvements. The total projected increase of 1.37 million tpy will boost Canada's newsprint capacity to 10.5 million tpy (from 9.13 million tpy) by 1983.

Canadian newsprint and groundwood capacity figures are questioned by many observers, who note that Canadian definitions—and a reluctance to pay U.S. tariffs for groundwood paper—appear to understate Canadian groundwood specialties capacity by nearly 1 million tpy, while overstating newsprint capacity by an equal amount. CPPA lists two new groundwood specialties machines and one conversion of a newsprint machine to groundwood specialties, bringing on 205,000 tpy and increasing that category to 865,000 tpy by 1983.

The only other paper grades showing any significant rise are book, writing, and miscellaneous fine papers. These grades are expected to increase by 15.1% to 1 million tpy due to expansions planned by MacMillan Bloedel Ltd. and Great Lakes Forest Products, and a 16.3% increase in tissue capacity to 464,000 tpy. Dominion Cellulose's new 30,000-tpy tissue machine represents the largest growth in tissue capacity.

Kraft paper capacity will be flat in the 1980-to-1983 period, dropping 1.8% to 552,000 tpy. Special papers capacity, which includes tissue other than sanitary, greaseproof, and glassine, will be virtually unchanged at 37,000 tpy.

Containerboard capacity will remain almost flat, rising only 95,000 tpy to 1.9 million tpy. Kraft linerboard capacity will edge up 4.4% to 1 million tpy, and semichemical corrugating-medium capacity will see a growth of 3% to 510,000 tpy. Recycled linerboard will jump by 11.4% to 292,000 tpy, however.

Boxboard capacity will rise by 3.2% to 833,000 tpy. This is largely on the strength of a 26,000-tpy increase in folding boxboard other than solid bleached board. Building paper and board capacity, including wet machine board, will remain largely stable, reaching 745,000 tpy in 1983.

Many major projects recently announced by Canadian companies were not included in the survey. Among the unlisted projects were British Columbia Forest Products Ltd.'s 160,000-tpy newsprint machine planned for 1985 in Hurdy, Alta., BCFP's 140,000-tpy TMP mill planned at the same time for the same area, newsprint machines planned by F.F. Soucy Inc. and Kruger Inc. for Quebec, a Soucy TMP plant, and a Western Forest Products Ltd. kraft pulp mill, along with other projects that are under study by many companies but were not yet officially announced.

B.C.'s share of Canadian pulp capacity will grow considerably, with 7.3 million tpy of capacity located in that province in 1983 out of 24.8 million tpy nationally, making it an extremely close second to Quebec's 8.0 million tpy.

Paper-grade chemical pulp capacity in B.C. will rise by 10.4% in the three-year period to 5.0 million tpy, while capacity elsewhere in Canada will show little change. Paper-grade mechanical pulp in B.C. will jump by 65.6% to 2.1 million tpy, while Quebec's capacity in mechanical pulp will rise 10.9% to 4.5 million tpy. Mechanical pulp capacity in the Atlantic provinces will increase by 26.2% to 1.8 million tpy. Capacity in Ontario and the prairie provinces for that grade of pulp will show little change.

In paper and board capacity, B.C. will claim capacity of 2.9 million tpy in 1983 out of 17 million tpy in all of Canada, making it still a distant third behind the 7.4 million tpy of Que. and the 4.2 million tpy of Ontario. B.C. newsprint capacity is scheduled for a 36.9% in-

Table 1. **Canadian industry annual capacity growth, 1980-83**
(000 metric tons)

Market pulp	**1980**	**1981**	**1982**	**1983**
Dissolving and special alpha	340	355	375	385
Sulfite paper grades	360	365	355	345
Sulfate paper grades	6330	6415	6655	6725
Bleached softwood	4905	4975	5235	5310
Semibleached softwood	550	505	505	505
Bleached hardwood	605	630	635	630
Unbleached	270	305	280	280
Total chemical paper grades (excludes dissolving and special alpha)	6690	6780	7010	7070
Increase from previous year	238	90	230	60
	3.7%	1.3%	3.4%	0.9%
Mechaical	240	260	475	475
Total market pulp capacity	**7270**	**7395**	**7860**	**7930**
Increase from previous year	158	125	465	70
	2.2%	1.7%	6.3%	0.9%

Paper and board	**1980**	**1981**	**1982**	**1983**
Newsprint	9130	9445	10,070	10,500
Groundwood printing and specialty	660	725	785	865
Book, writing, and miscellaneous	982	1025	1091	1130
Kraft papers	562	583	564	552
Multiwall sack	278	283	262	263
Other kraft papers	284	300	302	289
Special papers	38	37	37	37
Greaseproof, glassine, and others	19	18	18	18
Tissue (other than sanitary)	19	19	19	19
Sanitary papers	399	434	459	464
Containerboard	1818	1859	1897	1913
Kraft linerboard	958	974	998	1000
Recycled linerboard	262	279	285	292
Semichemical corrugating medium	495	500	505	510
Recycled corrugating medium	103	106	109	111
Boxboard	807	805	819	833
Solid bleached	95	95	100	103
Folding (excluding solid bleached)	319	324	335	345
Other boxboard	393	386	384	385
Total excluding building and other	14,396	14,913	15,722	16,294
Building and other	750	730	730	745
Wet machine board	5	10	10	15
Building papers	276	276	276	276
Building board, soft	264	264	264	274
Building board, hard	205	180	180	180
Total paper and board capacity	15,146	15,643	16,452	17,039
Increase from previous year	50	497	809	587
	—	3.3%	5.2%	3.6%

Source: Canadian Pulp & Paper Assn. Capacity Survey 1980-83

crease to 1.9 million tpy, far outstripping the rate of growth for other regions. Quebec's newsprint capacity expansion will be 9.1% to 4.7 million tpy, and Ontario's capacity will go up 9.8% to 2.0 million tpy. The Atlantic provinces are expected to show a 19.2% jump to 1.8 million tpy. ☐

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Cover: This issue focuses on mill maintenance from the practical, hands-on viewpoint—techniques and equipment with a proven track record. (Cover art by Rik Olson.)

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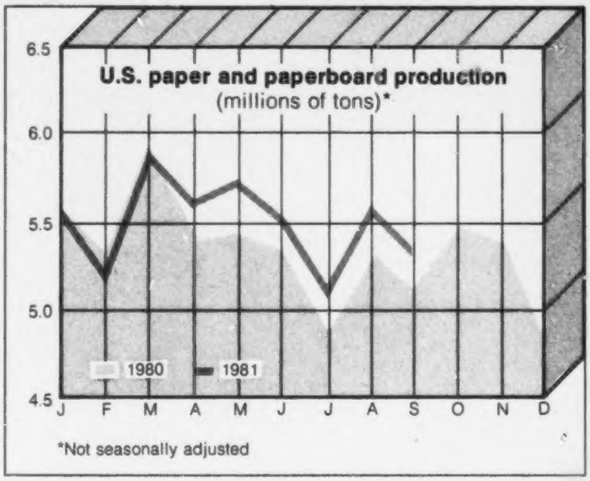
MONTH IN STATISTICS

U.S. paper and paperboard production came to 5.4 million short tons in September, bringing the seasonally adjusted annual rate for the August-September period to 65.9 million tons, close to the high reached in the first two-month period of the year, according to the American Paper Institute. The steady pattern of paper production contrasts with the weakness shown in some of its major markets.

Among paper grades, the strength was concentrated in newsprint and printing/writing papers, with all major grades showing modest increases. The rates of incoming orders as well as the backlog of new orders for printing papers show a weakening trend in demand. The rate of paperboard production continued upward, with major strength in the containerboard grades. The rate of production of solid bleached and recycled board also increased. Production of unbleached kraft linerboard for export, however, declined sharply in September.

Total Canadian newsprint shipments reached 708,000 metric tons in September, up 10.3% over the year-earlier levels, according to the Canadian Pulp & Paper Assn. Mill operating rates were 92% vs 90% in September 1980.



*Not seasonally adjusted

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	September	435	11.8	5,227	12.4
Uncoated groundwood (s)	September	116	−4.9	1,447	−3.5
Coated paper (s)	September	434	11.3	4,963	7.9
Uncoated free sheet (s)	September	637	0.3	7,955	−0.7
Unbleached kraft packaging and industrial (s)	September	315	−3.4	3,953	−0.4
Tissue	September	360	1.4	4,477	2.1
Total paper	**September**	**2,568**	**4.6**	**31,291**	**3.7**
Kraft linerboard, unbleached	September	1,220	3.4	15,018	4.5
Semichemical medium	September	391	2.6	4,835	2.4
Bleached paperboard	September	319	3.6	4,029	3.4
Recycled paperboard	September	593	3.3	7,271	3.3
Total paperboard	**September**	**2,592**	**2.5**	**32,260**	**3.6**
Total paper and paperboard*	**September**	**5,351**	**3.1**	**65,966**	**3.3**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	August	4,757	5.4	52,712	3.3
Market pulp production	August	580	2.3	6,287	−4.7
Wastepaper consumption at paper/board mills	August	1,249	8.0	14,810	4.5
Pulpwood consumption (cords)	September	6,796	1.1	80,676	−0.8
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft^2)	September	21.094	1.1	187.093†	3.7
Containerboard inventories at box plants	Sept. 1	2,376	6.8		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	August	619	−5.9	8,343	−7.5
Imports of Canadian newsprint	August	499	−7.2	6,902†	−5.0
U.S. paper exports (including products)	August	356	−34.9	4,892	−1.1
Exports of unbleached kraft linerboard	September	128	−29.7	1,904	−22.4
Exports of woodpulp	August	2[illegible]	−43.5	2,948	−8.2
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	September	708	10.3	6,549†	1.4
Operating rates	September	92%	90%	94%	95%
Inventories held by U.S. consumers	Sept. 30	1,467	21.0		
Woodpulp shipments (export only)	September	479	−26.1	4,966†	−8.9
Operating rates	September	84%	86%	89%	95%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn.
*Includes construction and wet machine grades. †Not annualized. ‡Not directly comparable to year ago because of coding change. (s) = shipments.

FINANCE

Paper profits still sliding in third quarter

U.S. pulp and paper industry earnings in the third quarter continued their recessionary decline and dipped 2.3% below their depressed year-ago levels on an 8.8% rise in sales, according to a PULP & PAPER survey of 29 companies. Third-quarter after-tax profit margins dropped to 4.6% compared with 6.0% in the second quarter and 5.2% a year earlier.

Even harder hit, however, were eight more companies with large forest products holdings, which saw profits fall 49.3% on a 2.8% rise in sales due to the strangled housing market. Aggregate earnings for the total paper/forest products industry were down 20.7% on a 6.5% rise in sales.

IP profits down. "High interest rates and the continued slowdown in housing construction resulted in IP's wood products business being the worst since the housing slump began," said Edwin A. Gee, International Paper Co. chairman and CEO. IP reported profits down 23.6% on a 1% rise in sales, although the paper side of its business held up relatively well.

The story was not much different for other pulp and paper producers. The toll taken by the fall-off in lumber and plywood markets, coupled with the slowdown in forest product exports to recession-impacted Europe and Japan, brought profits below year-ago levels for almost half of all paper companies surveyed. In addition, Crown Zellerbach, Mead, and Scott, with British Columbia operations, were also hurt by the seven-week industry-wide strike in the province during the quarter. Helping several companies, however, were investment and energy tax credits for major capital spending projects, which aided in reducing the 1981 effective tax rate and perking up earnings.

Demand strength. Most companies, including Consolidated Papers, Fort Howard, St. Regis, and Scott, reported that demand remained strong during the quarter for newsprint, coated printing/writing grades, and tissue, helping price hikes in these grades to go through. A slowdown was seen, however, for lightweight coated and uncoated paper grades during the quarter, as well as for packaging grades and hardwood pulp.

Several companies also reported a fall-off in demand for linerboard and bleached board by the end of the quarter, and Union Camp Corp. reported taking several days' downtime at its Savannah, Ga., and Montgomery, Ala., mills as a result.

The general near-term outlook is gloomy, as the housing construction industry is not expected to improve until mortgage interest rates come down dramatically—and that is not foreseen until at least the second quarter of 1982. In the meantime, the cost/price squeeze which has been building in packaging products is expected to continue into the fourth quarter.

Canadian profits tumble. Canadian paper company profits, continuing to be hurt by the depressed housing market, were further slashed by the seven-week strike in British Columbia, and tumbled 52.3% below year-ago levels on a 0.9% rise in sales. Three companies, B.C. Forest Products, B.C. Resources, and MacMillan Bloedel, took actual losses for the quarter.

Abitibi-Price, however, reported a five-fold increase in earnings over the third quarter of 1980, when most of its pulp and paper operations were crippled by strikes. And Consolidated-Bathurst registered a 9.1% increase in earnings, while Great Lakes Forest Products matched its year-earlier performance.

U.S. PAPER/FOREST PRODUCTS RESULTS

	Third quarter (000 dollars)			
Paper companies	**Sales**	**Change 1981/80**	**Earnings[1]**	**Change 1981/80**
Chesapeake	$87,483	13.1%	$7,812	20.3%
Clevepak	29,900	14.1	1,270	162.9
Consolidated	133,273	7.2	12,038	−1.2
Crown Zellerbach	790,400	0.4	6,900	−21.6
Diamond	318,700	4.6	5,400	−41.4
Federal Paper	118,595	11.6	6,162	−2.4
Fort Howard	129,724	19.0	22,834	26.9
Glatfelter	72,208	17.9	4,058	−14.9
GN Nekoosa	375,700	8.0	22,700	−3.8
Hammermill	303,467	19.1	8,176	24.1
Int'l. Paper	1,271,800	1.0	54,000	−23.6
James River (7/26)[2]	178,022	128.6[3]	4,217	1273.6[3]
Kimberly-Clark	713,700	8.7	42,600	−3.0
Longview (7/31)[2]	102,231	15.6	4,986	n.m.[4]
Mead	760,365	9.9	22,493	−30.7
Mosinee	22,824	21.6	1,804	79.1
Pentair	55,605	8.1	2,213	−15.5
St. Regis	707,649	3.3[5]	43,235[5]	4.3[5]
Scott	575,154	18.5	25,935	573.3
Sonoco	131,160	14.8	8,687	0.3
Sorg	22,410	20.4	581	423.4
SW Forest	193,030	7.0	1,664	−81.7[7]
Stone Container	101,963	10.8	6,420	43.3
Union Camp	430,607	7.3	44,362	8.0
Wausau (8/31)[2]	196,544	20.1	2,650	−60.6
Westvaco	392,695	12.5	25,395	26.4
Willamette	249,812	—	3,743	−82.5
Total	**8,465,021**	**8.8**	**392,335**	**−2.3**
Forest products				
Arcata	183,726	−4.2	4,692	−24.0
Boise Cascade	781,480	2.3[6]	18,470	−37.0[6]
Champion Int'l.	1,008,839	5.5	24,465	−51.0
Georgia-Pacific	1,400,000	9.4	31,000	−58.1
Louis.-Pacific	254,410	−14.8	(2,550)	n.m.
Pope & Talbot	52,994	−5.1	(698)	n.m.
Potlatch	225,134	7.4[5]	6,595	−49.8[5]
Weyerhaeuser	1,097,150	−1.3	50,052	−27.3
Total	**5,003,733**	**2.8**	**132,026**	**−49.3**
U.S. total	**13,468,754**	**6.5**	**524,361**	**−20.7**

CANADIAN PAPER INDUSTRY RESULTS

Abitibi	C$453,358	73.3	C$33,585	509.1
B.C. Forest	128,900	−40.8	(14,300)	n.m.
B.C. Resources	167,500	52.3	(2,100)	n.m.
Con-Bathurst	379,086	14.4	27,967	9.1
CZ Canada	136,000	−21.8	(2,500)	n.m.
Domtar	473,700	11.8[5]	17,700	−26.6[5]
Fraser	114,511	33.0	4,296	−39.0
Great Lakes	429,295	5.3	61,554	0.0
Mac. Bloedel	363,300	−40.1	(38,400)	n.m.
Total	**2,845,860**	**0.9**	**87,802**	**−52.3**

1. Income after taxes, from continuing operations, excluding most significant nonrecurring items in both years. 2. Period ended. Figures for James River are for first quarter, Wausau are for fourth quarter. 3. Reflects acquisition of Brown Co., final in October 1980. 4. Reflects income loss in 1980. 5. 1980 figures restated by company. 6. Reflects acquisition of Drum Financial Corp., final in September 1981. 7. Reflects $2.8-million gain from assets sale in 1980. n.m. = not meaningful.

Corrugated box shipments to rise

Similar growth in box shipments seen for next year, but longer-run outlook may be dampened by liner shortfall looming in 1983-84, FBA meeting told

By WILL MIES, News and Business Editor

□ Corrugated box shipments are headed for their second-best year on record despite some weakness in the final quarter of 1981, and should reach a new high in 1982, speakers told Fibre Box Assn.'s Oct. 21-23 annual meeting in San Francisco.

Shipments of boxes in 1981 are expected to hit 249.2 billion ft², up 3.2% from last year's depressed level, and are only about one-half percent below 1979's peak of 250.6 billion ft², **Thomas J. Muldoon**, FBA executive vice president, noted.

And next year, box shipments should rise by 3.0% to 256.6 billion ft² as the economy picks up momentum in the second half, helped by a turnaround in consumer spending, predicted **S.P. Moscarello**, vice president of Merrill Lynch Economics.

Shipment increases could accelerate further in 1983 and 1984, but casting a shadow over this rosy picture is a possible linerboard shortfall those years, **W.A. Copeland**, president of Copeland Economics Group Inc., indicated in his remarks to about 50 industry executives attending the meeting.

Seasonal pattern disappears

"For many years, the corrugated box industry followed a pattern of high volume in the spring and fall, with lower volume in the summer and winter months," stated Muldoon, "but for the last several years this has not been true. The basic economic forces in the country have altered the traditional seasonal pattern."

In 1979, shipments in the first two quarters were at the same volume level; and the third and fourth quarters, while lower, were also practically the same, he noted. Then in 1980, the first quarter was not only the highest first quarter on record, but the highest of any quarter in the history of the industry. The second and third quarters were down, followed by the beginning of a recovery in the fourth quarter (Figure 1).

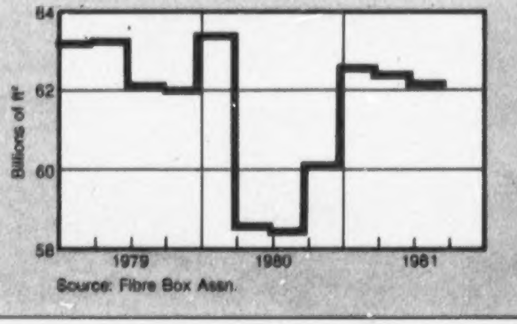
In 1981, shipments "just lumped along, with each month and each quarter being about the same as the period before," Muldoon continued. First quarter shipments were down just 1.4% from the all-time-high first quarter of 1980, while the second quarter had a year-to-year increase of 6.5%, followed by a 6.4% rise in the third quarter. "These gains were not due to any great increase in shipments, but rather to the low level of shipments last year." Fourth-quarter forecast is for a 1.9% gain, resulting in an overall 1981 increase of 3.2%, the FBA executive indicated.

Sun Belt leads in shipments growth

"The largest growth in corrugated box shipments over the 1970-80 period has been in the Sunbelt areas, reflecting the migration of industries to the South and West," Muldoon noted. The Southeast has had the greatest growth, an increase of almost 65% over the ten-year span, for about a 6%/year compounded average. The South Central and Western states each had strong increases of 48%, while the smallest increase was in the East Central states, with a ten-year gain of only 4.9%, well under one-half percent/year.

Comparing 1980 to 1979, Muldoon said all areas registered declines. The Pacific Coast region almost matched its 1979 shipments with a decline of just 0.1%, while the Southeast and South Central were identical at −0.7%. The Northeast and North Central states were almost the same at −5.2% and −5.3%, respectively, while the East Central states—which are heavy in automotive parts and appliances industries—suffered the most, down 10.1%.

Figure 1. **U.S. corrugated box shipments by quarters, 1979-81**



Source: Fibre Box Assn.

3.2% in '81 despite soft economy

Through the first three quarters of 1981, all geographic areas have registered shipment increases, Muldoon said. South Central has had the largest gain of 6.7%, followed by the East Central area, the most depressed area last year, with a 5.9% increase. The Pacific Coast was up 5%, while the smallest gain was in the Northeast with a rise of just 0.5%. Total industry shipments through the first nine months of this year were 3.7% better than in the same period of 1980.

Shipments diverge slightly from FRB index

Corrugated box shipments tracked the Federal Reserve Board's index of industrial production all through 1979 and the first few months of 1980, then both dived at almost the same time, Muldoon said.

Then box shipments turned up before industrial production did, and their ratio remained in the range of 101 to 103 in the later months of 1980 and up to February of this year. The ratio then dropped in the spring of 1981 as industrial production was inching upward, "probably indicating some inventory liquidation in anticipation of a business downturn." Since June, Muldoon noted, the ratio has been moving upward again.

Weakness in corrugated price trend

FBA's corrugated price index increased quarter by quarter through 1979 and the first and second quarters of 1980. In second-quarter 1980, the index reached 214, then in the third quarter dropped slightly to 213, but went back to 214 in the fourth quarter (Figure 2).

The first quarter of 1981 saw a 4% rise to 223, and in the second a further rise of 4.4% to 233, but in the third quarter the index dropped one point, the same as happened in 1980, he noted. Since the first of the year, the price index has increased by 8.4%.

Comparing the corrugated price index with the government's producer price index, Muldoon said that "the gap between the two has been widening." In the first two quarters of 1979 the difference was 45 points, with the spread gradually increasing to 65 points in the fourth quarter of 1980.

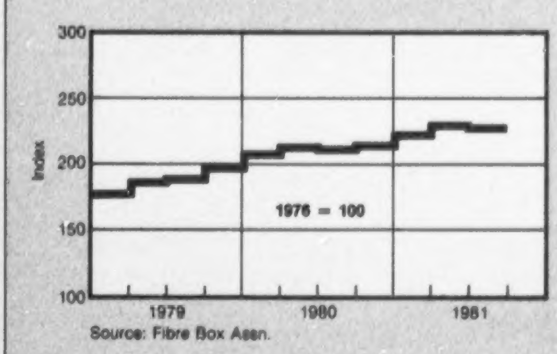
The corrugated index kept up in the first quarter of 1981, when the gap remained at 65 and the spread narrowed somewhat in the second quarter to 61 points. But in the third quarter the difference increased again to 64 points, Muldoon said.

Containerboard inventories climb

Unbleached kraft linerboard mills ran at about 98% of capacity in 1979 and kept up that pace through the first half of 1980, averaging about 97%, according to Muldoon. But as exports began to decline late in 1980, containerboard inventories at box plants and mills began to climb. Mills cut back their production, bringing the operating rate for the year down to 96% (Figure 3).

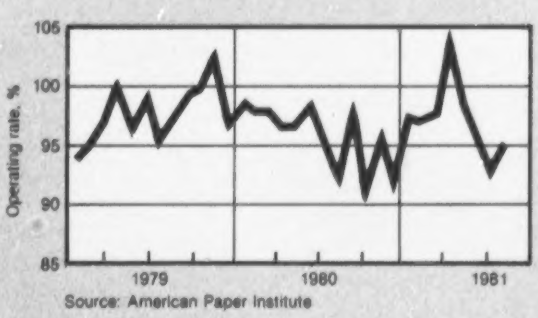
"The mills started 1981 with a bang, shooting over the 100% mark in April," Muldoon said. As a result of weak export demand, containerboard inventories have been rising steadily since February, from 1.96 million tons

Figure 2. **Corrugated box price index, 1979-81**



Source: Fibre Box Assn.

Figure 3. **Unbleached kraft paperboard mill operating rates, 1979-81**



Source: American Paper Institute

that month to 2.45 million tons Oct. 1. Weeks of supply rose from 5.5 weeks in Feb. 1 to 7.0 weeks on Aug. 1, but declined to 6.7 weeks at the beginning of October due to a higher usage level (Figure 4).

Consumer-led economic recovery

Softness in the economy should extend from the fourth quarter into the first quarter of 1982, according to Moscarello of Merrill Lynch, which provides forecasts for FBA. But the economy should begin to recover in the second half of next year, and the key variable "will be the consumer coming back to the marketplace," he said.

For several years, real disposable income has been declining as inflation—as measured by the consumer price index—has outstripped personal income gains. But next year the inflation rate is expected to moderate, resulting in a turnaround in real disposable income and retail sales.

One major cause for optimism on the inflation front comes from energy costs, Moscarello noted. While the cost of a barrel of imported crude oil soared 70% in 1979 and 40% in 1980, its cost this year rose a mere 5% to 6% and should not go up much more than that in 1982.

In this economic environment, corrugated box shipments are expected to show increasing strength as 1982 progresses, starting off with a 0.7% first quarter decline from year-earlier levels, followed by gains of 3.9%, 3.0%, and 5.7% for the remaining three quarters, for a full-year increase of 3.0% to 256.6 billion ft^2 (Table 1).

On a regional basis, Moscarello projected the Southeast would register the largest gain in shipments next year at 4.8%, while other parts of the country would show increases ranging from 2.1% in the North Central states to 2.9% in the South Central region.

As for end-use markets, fastest growth in corrugated box shipments in 1982 is projected for chemicals (+6%), household appliances (+6%), plastics (+4%) and fabricated metals (+4%). Food and beverage—largest end-use market—is projected to show a 3% gain in shipment volume, while slower volume growth is expected in the paper, furniture and stone, clay and glass industries.

Tight liner market forecast

A somewhat more upbeat projection on corrugated box shipments was presented by Copeland, who estimated that shipments would rise 3.8% this year to 250.6 billion ft^2, and 4.4% in 1982 to 261.6 billion ft^2, then will rise by more than 5.5% in 1983 and 5.9% in 1984 to 292.3 billion ft^2.

Based on these shipment levels, he projected containerboard production for domestic use would rise by 5.6% to 19.1 million tons in 1981 and 4.7% to 20.0 million tons in 1982. Exports of both linerboard and medium, however, are expected to drop 30.7% to 1.87 million tons, then rise 26.5% to 2.37 million tons in 1982—and not approach 1980's record 2.70-million-ton level until 1984. One reason for the surge in export business last year was China, which Copeland expected would buy about 200,000 tons of linerboard from the U.S. in 1982.

Because of the downturn in exports, unbleached kraft linerboard production in 1981 is expected to rise by only 1.1% to 15.5 million, but then jump by 5.1% to 16.2 million tons in 1982. With planned capacity additions each year of roughly 3.5%, Copeland forecasts operating rates will fall from 96% in 1980 to 94% in 1981, and then partially recover to 95% in 1982.

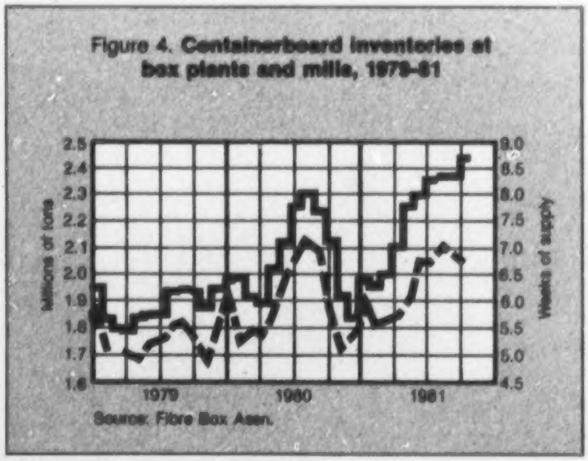
But with a 5.9% jump in production to 17.2 million tons projected for 1983 and only 0.5% capacity growth, operating rates will exceed 100%, and stay above that level in 1984, according to Copeland.

He does not expect any surge in new capacity to alleviate the probable shortfall, partly because of the long leadtime in building new mills, and also because return on new linerboard investments is not that attractive. And more than 300,000 tpy of existing liner capacity could even disappear if International Paper Co. decides to convert its Georgetown, S.C., paperboard mill to white paper and bleached market pulp.

Copeland estimated the current total U.S. mill cost for producing unbleached kraft linerboard, which sells for $300/ton, at about $270/ton, resulting in an average gross margin of $30/ton.

This puts U.S. producers at a favorable advantage compared to competitors in Sweden, whose average margin on linerboard production is estimated to only be about $5/ton. But the profit from producing linerboard is considerably less than what U.S. paper companies could make on producing other grades like market pulp, with a gross margin of $140/ton, or newsprint, with a margin of $100/ton. "When corporate management looks at available opportunities, they will have such comparisons in mind," Copeland said. ☐

Figure 4. **Containerboard inventories at box plants and mills, 1979-81**



Source: Fibre Box Assn.

Table 1. **Projected corrugated box shipments by quarter, 1981-82**

Quarter	**1981 shipments** (billions ft^2)	**% change from '80**	**1982 shipments** (billions ft^2)	**% change from '81**
1st	62.568	−1.4%	62.099	−0.7%
2nd	62.353	+6.5	64.783	+3.9
3rd	62.172	+6.4	64.058	+3.0
4th	62.087e	+1.9	65.629	+5.7
Year	249.180e	+3.2	256.569e	+3.0

e = estimated
Source: Fiber Box Assn. and Merrill Lynch Economics

Sludge disposal by combustion offers potential energy source

Secondary sludge can be dewatered using coal as a filter medium, and burned in a steam generator; process offers short payback

By JURGEN H. KLEINAU

☐ The pulp and paper industry has made substantial advances toward becoming self-sufficient in energy supply. This self-sufficiency is as much the result of greater utilization of process waste for fuel as from conservation efforts. Nationally, these conservation efforts have resulted in a measurable reduction in energy usage relative to gross national product (Table 1).

The industry has also made enormous strides in effluent treatment, resulting in an increased quantity of waste-treatment sludges to be handled. Disposal of these sludges is often as expensive as the waste-treatment process itself, and can consume large quantities of energy. Thus, it is important that the cost and energy consumption of sludge disposal not outweigh the benefits gained in waste-treatment operations.

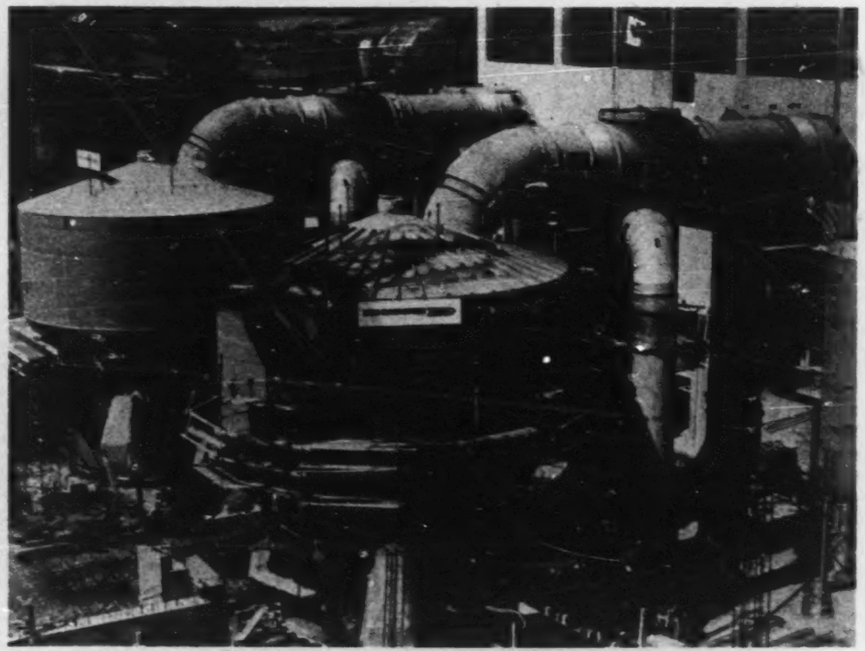
Sludge as a fuel

Ignoring the much more specialized conditions prevailing in mills producing high-ash coated grades, or ones utilizing deinking operations, the primary and secondary water-treatment sludges generated from pulping and papermaking operations consist predominantly of organic substances. The organic substances are combustible; thus, a conceptual approach to the disposal of sludge should consider sludge as a fuel and not waste. Approximately 6000 to 11,000 Btu/lb of organics are lost if sludge is landfilled. Only the high water content of secondary sludge prohibits the practice of this concept; therefore, sludge should be thought of as a dewatering problem, and not a disposal problem.

(Continued)

Table 1. Energy perspectives

	Energy usage in Btu/$ GNP (1979 basis)	Pulp, paper industry % Purchased fuel and energy
1972		59.1
1973	36,500	
1979	33,000	52.7
1980	32,700	52.4



Sludge combustion with steam generation.

Mr. Kleinau is manager of boiler systems, Dorr-Oliver Inc., Stamford, Conn.

Table 2. Sludge and resource recovery

Segregated use
  Land application
  Formed products

Extractive use
  Fiber recovery
  Energy recovery

Table 3. Comparison of disposal techniques

Incineration
  Minimizes capital cost for on-site disposal
  No investment recovery
  High maintenance and fuel cost

Steam generation
  Capital cost equal to or higher than solid-fuel-fired boilers (wood/coal)
  Investment recovery from steam generated
  Normal maintenance cost—low chargeable fuel cost

Because the dewatering problem is such a formidable one (especially for secondary sludges), industry has generally preferred to use the least capital-intensive disposal mechanism available—which is land application, primarily in the form of lagooning. Enormous variety exists in the details of different designs for sludge disposal, but fundamentally there are only four distinctly different methods (Table 2). Fiber recovery is purposely not mentioned in this context because it should be considered a means of improving internal process efficiency.

Energy recovery from sludge requires combustion. Incineration has been considered as a possible means of sludge combustion for many years. However, there have been few satisfactory experiences with this process. Designers have tried to improve the economics of sludge disposal through incineration by minimizing capital requirements. However, this approach is not consistent with the characteristics of a sludge combustion system designed for steam generation (Table 3). A steam-generation system for sludge combustion will have a capital cost equal to other solid-fuel-fired systems, but it will have a substantial return on investment. By contrast, an incineration system will always have a net cost.

Municipalities, with enormous wastewater treatment sludge-disposal problems, have begun to design for steam generation from sludge-combustion installations, especially when disposal of proportionately large quantities of secondary sludge is necessary. The economics of generating steam from sludge combustion in a sewage treatment plant are quite favorable. Retrofitting existing plants with waste-heat boilers is even more attractive, since payout time calculated on the waste-heat boiler alone can be as short as a few months.

Dewatering problems

Biological waste-treatment sludges contain large quantities of intracellular water which cannot be removed by mechanical dewatering. Special process steps such as anaerobic digestion, freeze drying, wet-air oxidation, and aerobic digestion can be employed to break cell walls, making additional water removal by mechanical dewatering possible. However, none of these processes remove all water from the sludge. Substantial quantities of water would still be carried into a combustion process if such pretreatment systems are used.

Alternatively, all water can be removed from sludge either by using evaporative processes or by allowing water to be evaporated in the combustion process itself. Pre-evaporation techniques have been successfully employed in the form of scraped surface evaporators and solvent carrier systems. Systems that are still in the development stage will provide for evaporation of sludge moisture in dryers utilizing fluegas or combustion-system solids as the drying medium.

The direct heat requirements for water removal from sludge vary substantially with the evaporation system chosen (Table 4). A careful specific analysis should be made to compare operating costs with capital-investment requirements for each system. The more energy-efficient a system is, the higher its capital cost.

The energy loss incurred when evaporating water in a sludge combustion system actually is quite nominal at the 1400-Btu/lb of water level (Table 4). In fact, the only actual loss of energy is the latent heat of vaporization of the water, plus the remaining low sensible heat in the water vapor leaving the steam generator at fluegas exit temperature. Sensible heat from burning the sludge organics, and from the support fuel, is recovered as steam.

Coal as a filter medium

In the past, sludge systems have been operated using expensive filter aids to improve dewatering, and expensive fuels, such as oil or natural gas, as support fuel. Thus, total operating costs easily became unacceptably high. A readily available and low-cost material which can be used as a filter aid and as a fuel is coal. Sludge filtration and vacuum incineration with pulverized coal has been reported. Full-scale trials, conducted in existing equipment retrofitted with the necessary material-handling systems, support earlier research work, and indicate that a practical operation has been achieved.[2]

One remaining concern is the SO_2 emission resulting from burning most coals. Adding a fluegas desulfurization system to a sludge combustion installation would result in another add-on process, additional capital investment and operating costs, and possibly another sludge-disposal problem. An alternative method is to use the demonstrated concept of capturing sulfur released from burning coal with limestone added to a fluidized-bed, combustor/steam generator.

A very simple process results from the combination of these concepts (Figure 1). Finely ground coal (less than $^1/_{16}$ in.) is mixed with sludge, which is dewatered mechanically on conventional equipment. The filter cake is then used as fuel in a fluidized-bed steam generator. Limestone added to the steam generator retains sulfur from the coal in the ash as calcium sulfate.

Reported research indicates that the sludge-cake dryness obtained using coal as a filter aid is more than adequate to reach the concentrations necessary for using the sludge cake as fuel (Table 5). For example, when 0.2 lb of coal are added to sludge for each pound of sludge sol-

Table 4. **Energy used to remove water from sludge**

Process	Btu/lb of water
Double-effect evaporation	950
Triple-effect evaporation	600
Fluegas dryer at 250°F (without steam generation)	1200
Burning in boiler with economizer or air heater	1400

Table 5. **Sludge cake dryness obtained with coal**

Coal added (lb/lb sludge solids)	Cake (% dry solids content)	% dryness required for fluidized-bed combustion
0.1	22	25
0.2	24	23.5
0.3	26	22.5
0.4	28	22

Table 6. **Projected economics of proposed steam from sludge system**

Sludge: 22,000 lb/hr at 20% solids (28% with coal as filter aid)

Annual operating costs (8000 hr)	
Fuel, 2640 lb/hr at $0.02/lb ($45/ton)	$ 480,000
Power, 400 kw at $0.03/kw	96,000
Disposal of ash, 2.4 ton/hr at $3.64/ton	69,000
Labor	60,000
Maintenance	60,000
	$ 765,000
Credits	
Disposal of sludge, 22 ton/hr at $3.64/ton	$ 640,000
Steam, 16,700 lb/hr at $5/million Btu	670,000
	$1,310,000
Available for indirect costs	**$ 545,000**

ids, the dry-cake solids content can be expected to reach 24%. A 23.5% level is required for this cake to become a fuel with stable combustion characteristics. Specific data must be developed for each type of coal and sludge involved. There will also be minor heat requirements for calcination of the limestone added for sulfur control.

The technology of SO_2 control by limestone addition to fluidized-bed coal-fired boilers has been well documented (Figure 2). The amount of limestone required for control of a given fuel sulfur content and SO_2 control requirements is highly dependent upon several variables. The nature of the limestone itself is probably the most important variable, but combustion temperature, solids-retention time in the boiler, and gas-retention time in the boiler must be considered.

Projected economics for the system, as described in this article (Table 6) were estimated on the basis of 1980 costs. Indications are that economic credits occurring from this system (by way of reduced cost of sludge disposal and the value of steam generated) will provide for a return on investment which cannot compete with that obtained from building disposal plants which make a salable product. However, these economic credits will be very attractive compared with a disposal system (landfilling) which provides no return at all. □

Figure 1. **Simplified sludge-to-energy system**

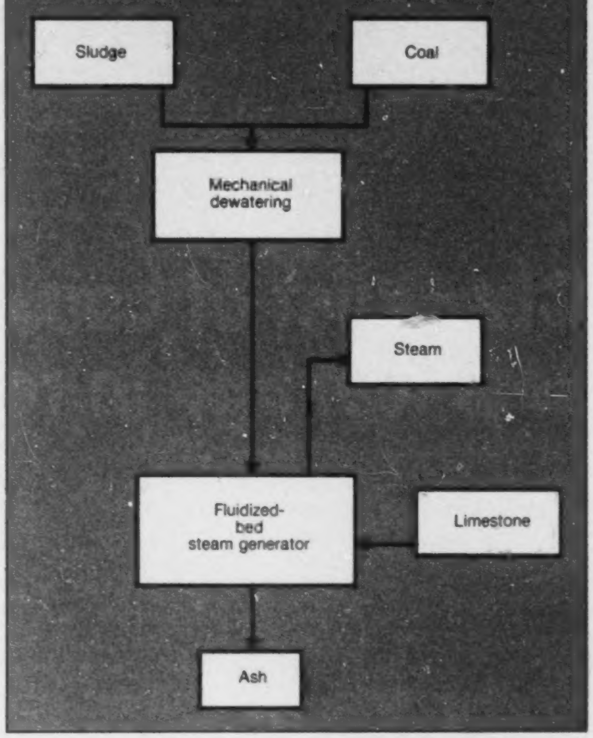
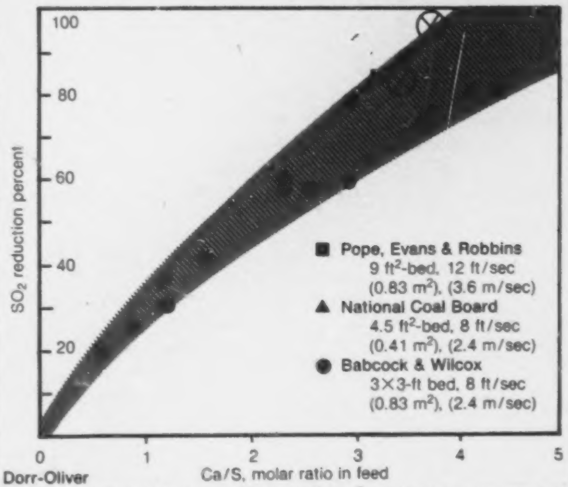


Figure 2. **Ca/S ratio vs SO_2 reduction**



Dorr-Oliver
⊗ 12-in.-dia bed, 6 ft/sec (1.8 m/sec), (0.3 m²), anthracite culm, crushed meckey, limestone—1550°F (843°C)

*All data for medium- to high-sulfur eastern coal, using crushed coal and crushed limestone at bed temperatures—1550°F (843°C)

REFERENCES

1. S.W. Hathaway, R.A. Olexsey, *Journal, Water Pollution Control Federation*, Dec. 1977, pp. 2419-2430
2. G.J. Swanson, D.C. Bergstedt, *Journal, Water Pollution Control Federation*, July 1979, Vol. 51.

Hydrogen peroxide usage growing, prices stable

By BARRY SHOCKETT

The outlook for hydrogen peroxide (H_2O_2) appears to be bright through the end of the decade in both the U.S. and Canada. Demand is expected to continue to grow due to both new end uses developed over the past five years (such as in-situ uranium mining and geothermal energy production), and the growth in most other areas. In the paper industry, increased groundwood and TMP capacity, and the use of more recycled newsprint will result in high demand for the bleaching agent. It is also being used in some southern U.S. mills as a partial replacement for chlorine and chlorine dioxide in bleaching chemical pulp.

Canadian H_2O_2 consumption in 1981 is up, as a result of a relatively strong performance by the newsprint sector.

U.S. statistics for hydrogen peroxide

	1978	1979	1980	1981
	(000 short tons)			
Nameplate capacity	136	143*	197.25**	193
Production	107.5	104.5	130	140
Consumption, apparent	110	114	122.5	130
Pulp bleaching	17.5	18.25	20	21.5
Exports	10	9	13.5	15
Imports	12.5	18.5	6	5

*Including prorated capacity of Interox America's 44,000-tpy plant, on-stream in November 1979
**Including prorated capacity of Shell's 17,000-tpy facility, closed in March 1980

Canadian statistics for hydrogen peroxide

	1978	1979	1980	1981
	(000 short tons)			
Total demand	5.4	5.8	7.4	8.3
Pulp bleaching	3.1	3.4	5	5.7
Miscellaneous*	2.25	2.35	2.35	2.55
Imports	5.4	6.2	6.8	8.3

*Includes textile bleaching and water treatment

HYDROGEN PEROXIDE

UNITED STATES

Uses: H_2O_2 is used for bleaching chemical and mechanical pulps and in the deinking of recycled newspaper. Largest end-use is chemical synthesis (28%). Other applications include waste and water treatment, textiles, and mining.

Demand: In 1981, the paper industry will consume 21,500 tons, or 15% of the total 140,000 tons produced. This is up from 20,000 tons in 1980.

Sources: The four U.S. producers in decreasing order by capacity are: DuPont, FMC, Interox America, and PPG. In 1979, imports accounted for 16%, up from 11.5% in 1978. In 1980, imports dropped drastically due to increased domestic capacity (FMC and Interox).

Availability: 1981, market; 1980, market; 1979, market; 1978; market.

Pricing: The bulk price for 70% solution, posted in January 1981, is unchanged at 39.5¢/lb f.o.b producing point, freight-equalized. 1980, 35.5¢-36.5¢/lb; 1979, 32.5¢/lb.

Forecast: Paper industry demand should grow about 8%/year. Growth in bleaching applications other than deinking could easily raise this to 10%/year. Nonpaper markets are expected to grow slowly or hold steady.

Capacity will increase also, so no supply problems should occur. FMC is planning a 10,000-tpy expansion at its new Bayport, Texas, facility.

CANADA

Uses: H_2O_2 is used to bleach mechanical and chemical pulps and by some mills to replace one or more chlorine dioxide stages if the ClO_2 generator is not operating. A relatively new use in one pulp mill is to add a small amount of H_2O_2 to the first extraction stage to reduce effluent color. Other uses include textile bleaching and water treatment.

Demand: In 1981, the pulp and paper industry will consume 5700 tons of a total demand of 8300 tons, or 68.5%. Other uses include textile bleaching (10%), water treatment (6%), and miscellaneous (15%).

Sources: All hydrogen peroxide used in Canada is imported—most from the U.S., and some from Europe (about 20%). Importers include C-I-L, duPont Canada, and Interox, who now ships in directly from Houston.

Availability: 1981, market; 1980, market to tight; 1979, market; 1978; market.

Pricing: Canadian prices are related directly to U.S. prices, and thus remain at January levels. Currently, the bulk price for 70% solution, f.o.b. producing point, is $1.16/kg (52.2¢/lb). Pricing history: 1980, 95.8¢-1.05¢/kg (43.5¢-47.5¢/lb); 1979, 90.6¢-95.8¢/kg (41¢-43.5¢/lb).

Forecast: The growth in thermomechanical pulping (TMP), including expansions of existing mills as well as new facilities, should ensure a steady 10%/year growth in H_2O_2 consumption by the pulp and paper industry for the next three years. As capacity expansion peaks in 1985 this could reach 25%/year, but it will drop off to 5% to 10%/year through the end of the decade.

Ontario Paper's expansion at Thorold, Ont., will significantly increase use of recycled newsprint. This in combination with TMP expansions will make it a major H_2O_2 consumer by 1983.

Mr. Shockett is consulting editor-chemical markets for PULP & PAPER.

PULP & PAPER

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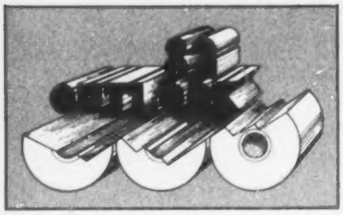

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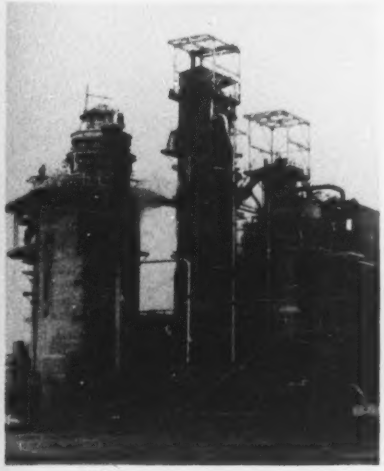

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Cover: North American pulp and paper industry faces a downturn in first quarter 1982, but gradually increasing operating rates are expected to bring an end to current recession by mid-year. (Cover art by Rik Olson)

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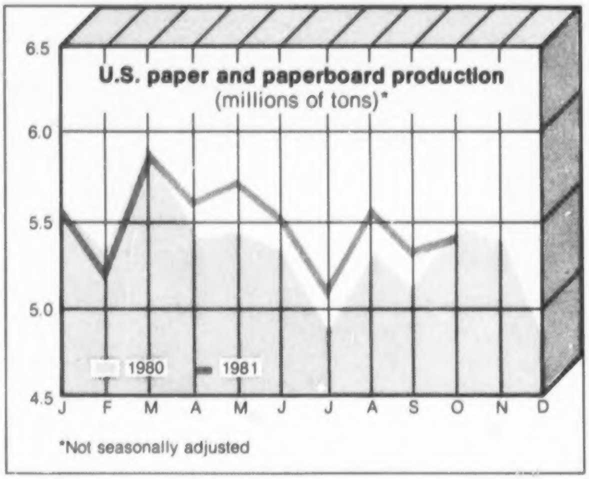
MONTH IN STATISTICS

U.S. paper and paperboard production in October came to 5.4 million tons, 2.1% below October 1980 levels, and bringing the seasonally adjusted annual rate for the year-to-date output to 64.2 million short tpy, 2.9% above the comparable 1980 rate, according to the American Paper Institute. Data on the early weeks of November production point to further declines, particularly in paperboard, API noted. October paper production was also about 4% above the rate of shipments, API said, indicating some inventory building at paper mills.

Among major grades, newsprint continued to show the greatest strength, with October production up a hefty 11.3% over year-earlier figures, and annualized year-to-date up 12.4%. Production of uncoated papers and unbleached kraft packaging was below year-ago levels, while coated papers held even. Paperboard production in October was below 1980 levels in all major grades, bringing total paperboard output 2.0% below 1980.

Total Canadian newsprint shipments in October reached 795,000 metric tons, up 8.1% over year-earlier levels, according to the Canadian Pulp & Paper Assn. Newsprint mill operating rates were 97% vs 94% in October 1980.



*Not seasonally adjusted

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	October	463	11.3	5,267	12.4
Uncoated groundwood (s)	October	127	−2.3	1,447	−3.9
Coated paper (s)	October	424	0.2	4,977	7.1
Uncoated free sheet (s)	October	644	−7.6	7,970	−1.0
Unbleached kraft packaging and industrial (s)	October	307	−8.9	3,926	−1.2
Tissue	October	380	2.4	4,498	2.4
Total paper	**October**	**2,621**	**−0.8**	**31,297**	**3.2**
Kraft linerboard, unbleached	October	1,213	−1.1	14,966	3.9
Semichemical medium	October	395	−5.3	4,823	1.5
Bleached paperboard	October	324	−0.3	4,015	3.1
Recycled paperboard	October	602	−5.6	7,266	2.4
Total paperboard	**October**	**2,629**	**−2.0**	**32,186**	**3.0**
Total paper and paperboard*	**October**	**5,444**	**−2.1**	**65,795**	**2.5**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	September	4,522	3.5	52,596	3.4
Market pulp production	September	481	−4.2	6,231	−4.8
Wastepaper consumption at paper/board mills	September	1,209	0.8	14,776	4.4
Pulpwood consumption (cords)	October	6,645	0.7	80,572	−0.6
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	October	21.867	−5.1	209.013†	2.7
Containerboard inventories at box plants	Oct. 1	2,446	16.5		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	September	618	−11.7	8,240	−7.9
Imports of Canadian newsprint	September	513	−7.4	6,819†	−5.3
U.S. paper exports (including products)	September	360	−30.5	4,828	−5.1
Exports of unbleached kraft linerboard	October	130	−24.9	1,869	−23.7
Exports of woodpulp	September	347	10.9	3,762	−2.6
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	October	795	8.1	7,344†	2.1
Operating rates	October	97%	94%	94%	95%
Inventories held by U.S. consumers	Oct. 31	1,492	26.3		
Woodpulp shipments (export only)	October	563	−1.6	5,529†	−8.2
Operating rates	October	95%	95%	87%	95%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn.
*Includes construction and wet machine grades. †Not annualized. ‡Not directly comparable to year ago because of coding change. (s) = shipments.

Newsprint: Recession and new capacity hurt operating rates

Statistics:	**1980**	**1981**	**1982e**
UNITED STATES			
Production, 000 short tons	4672	5065	5300
Capacity, 000 tons	4826	5334	5640
Utilization rate, %	97	95	94
Apparent U.S. consumption			
000 tons	11,120	11,175	11,345
lb/capita	97.7	97.2	97.8
000 tons/$ billion real GNP	7.50	7.41	7.52
CANADA			
Production, 000 short tons	9507	9650	9550
Capacity, 000 tons	10,064	10,411	11,100
Utilization rate, %	94	93	86

e = Estimate

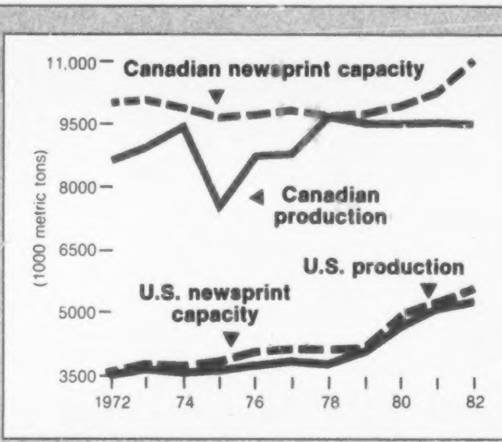
Grade structure: The standard basis weight for newsprint is now 30 lb/3000 ft^2, down from the 32-lb paper that was common before 1974. Small amounts of newsprint as light as 28.5 lb or less are made. While letterpress printing continues to predominate among large U.S. newspapers, a pronounced shift toward offset has begun, and offset accounts for more than 25% of all U.S. consumption. Newspapers consume most newsprint, with small amounts going into advertising supplements, government publications, comic books, and commercial printing.

Production/capacity: Significant capacity additions in the U.S., combined with relatively flat demand, kept U.S. mills running at a slightly higher rate than Canadian mills, while British Columbia mills were shut down for seven weeks by a strike. But the strike ended with inventories high—total consumer stocks in the U.S., at 1.6 million tons in September, were up 21% from a year earlier—and publishers, faced with falling advertising revenues, were cutting orders in late 1981.

Two new 210,000-tpy machines came on-line in 1981, brought on by North Pacific Paper and Publishers Paper, along with a 140,000-tpy St. Regis Paper machine conversion. U.S. capacity additions were absorbed by displacing Canadian tonnage, and Canada was forced to sell more abroad to keep its operating rate up. At the same time, Abitibi-Price and MacMillan Bloedel were bringing new 175,000-tpy machines online in Canada.

Outlook: Consumption was virtually flat in most areas of the U.S. in 1981 and was expected to remain so for the first half of 1982, with the exception of modest inventory building before mill labor talks scheduled for the spring. Three new Canadian machines, averaging 190,000 tpy each, plus other expansions, are scheduled for 1982; and this, along with still uncomfortably high interest rates and price-hike announcements, is expected to keep stock accumulation to a minimum. Consumption should strengthen in the second half, but further capacity additions will probably keep operating rates depressed. With the U.S. GNP expected to remain unchanged in real terms in 1982, and newsprint consumption not likely to rise by more than 1.5%, North American operating rates will be lower than in recent years—several points below, in Canada's case.

Pricing: Prices rose $27/short ton to $453 during the summer of 1981, and a further $23 increase was announced for the spring of 1982, against some consumer resistance. Price history is as follows (U.S. East contract): 1970, $152; 1971, $158; 1972, $165; 1973, $170; 1974, $235 (30-lb), $220 (32-lb); 1975, $260 (30-lb); 1976, $285; 1977, $305; 1978, $345; 1979, $375; 1980, $426; 1981, $453.



Estimated annual capacities of top companies are:

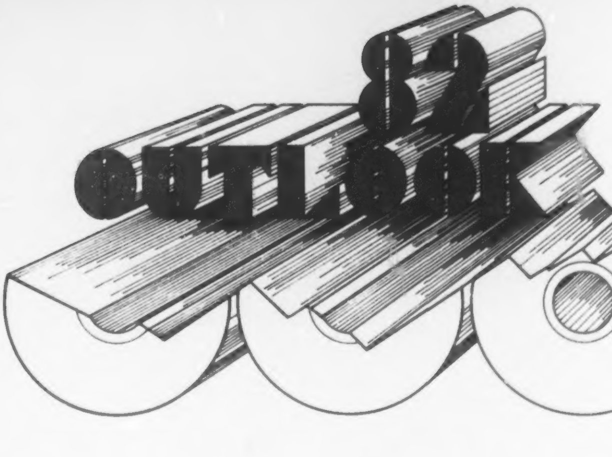
Annual capacity (000 short tons)

	Canada	**U.S.**	**Total**	**Capacity share (%)**
1. Abitibi-Price Inc.	1811	150	1961	12.5
2. Bowater Inc.[1]	557	866	1427	9.1
3. MacMillan Bloedel	1210	—	1210	7.7
4. CIP Inc.	1150	—	1150	7.3
5. Consolidated-Bathurst	1032	—	1032	6.6
6. St. Regis Paper[2]	—	850	850	5.4
7. Boise Cascade Corp.[3]	230	523	753	4.8
8. Ontario Paper	700	—	700	4.4
9. Kimberly-Clark[4]	171	420	591	3.8
10. Garden State Paper[5]	—	487	487	3.1
11. Kruger Inc.	486	—	486	3.1
12. Crown Zellerbach	265	172	437	2.8
13. Great Lakes Forest Products	430	—	430	2.7

[1] Includes 215,000 tons from Catawba Newsprint Co., which is 51% owned.
[2] Southland Div.
[3] Includes 350,000 tons of capacity at Boise Southern Co., DeRidder, La.
[4] Includes production at Spruce Falls Power & Paper Co., which is 50.5% owned.
[5] Includes 47,000 tpy, its prorated share of Southeast Paper, which is one-third owned by Garden State.

North American capacity (1981): **15.745 million tons**
Capacity share of top five companies: 43.1%
Capacity share of top ten companies: 64.6%

Markets: U.S. newspapers bought 60.6% of their newsprint from Canada in 1980, down from 63% in 1979 and 66% in 1978. Expanding U.S. capacity is expected to continue this trend.



U.S. paper industry should climb out of recession in second half

Industry facing tough first quarter but production expected to improve in second half; prices may not keep up with costs, resulting in margin squeeze

SPECIAL PULP & PAPER REPORT

☐ As the U.S. paper industry slid into recession in the fourth quarter of 1981, the big question was: how long and how deep will the downturn be? The recession was the second to beset the paper industry in two years, and it came at a time when the wood products side of the forest industry was still mired in the worst depression in housing since World War II.

Adding to the uncertainty was the fact Washington was not responding to the downturn in the traditional manner. The Reagan Administration was not stepping up spending to create new jobs or pumping in money to rescue ailing industries, for example. And while the Federal Reserve Board late last fall was easing the reins on money supply growth, causing interest rates to tumble, its policy was still tight compared to past recessions.

Also worrisome were the large budget deficits forecast under the Reagan program, which—unless reduced by additional budget cuts or new taxes—could lead to a resurgence in inflation and interest rates this year, according to some economists.

Nevertheless, most industry executives were still supporting the thrust of the Administration's program. "Controlling government spending and providing incentives for job-creating investments are important steps in the right direction for economic improvement," commented Dr. Edwin A. Gee, chairman of International Paper Co. "Unfortunately, the program may not reduce interest rates and inflation to the levels the Administration has been predicting. When fully implemented, however, the program should result in a stronger economy and improved business oppportunities."

Economy pickup expected toward mid-year

After surging in the first quarter and then teetertottering the next two quarters, the economy dropped sharply in the final period of 1981, with most estimates of the decline in real GNP ranging from 4% to 6%. Most forecasters are predicting the first quarter of 1982 will also show negative economic growth, with a recovery beginning in either the second or third quarters.

On the optimistic side, Norma Pace, senior vice president, American Paper Institute, expects real GNP growth for all of 1982 to be 2.5%, and maybe as high as 3%. She blames last fall's weakness in retail sales on a high savings rate by individuals and expects "a consumer-led recovery" to begin in the second quarter of 1982.

Gee believes the economic upswing "will not have the strength of some past recoveries and will be felt primarily in the second half of the year." He looks for 2% real GNP growth, while St. Regis Paper Co.'s planning dept. expects 1.2% growth.

Among the seven leading security analysts polled by P&P, estimates for real GNP growth range from −0.6%

Outlook '82 was prepared by P&P's news staff consisting of Will Mies, Dave Allan, Paula Irons, Debra Adams and Marty Free.

projected by George B. Adler of Smith Barney, Harris Upham & Co. to +2.5% expected by Mark Rogers of L.F. Rothschild, Unterberg, Towbin—with the average of all their forecasts coming in at +0.4% (see table page 81).

Capacity may outpace production growth

U.S. paper/board production held fairly steady through the first three quarters of 1981, then began to drop in October and November. For all of last year, however, production will probably be up around 1.8% to a record level near 65 million tons, exceeding the 1979 peak of 64.6 million tons.

Production is expected to remain weak in the first quarter of this year and then begin to show some improvement in the second or third quarters. Pace expects production to about match her 2.5% to 3% projection for real economic growth. Among major grades, she says that linerboard output could be up 3.5%, while printing/writing paper could advance 2% to 2.5%.

"Although forecasting a relatively slow recovery for the industry in 1982," Gee expects "some modest improvements in the operating rates of our plants and mills, and in the current highly unsatisfactory relationship between costs and prices."

Nevertheless, he is more optimistic than most analysts, whose estimates of paper and board production next year range from a 1.8% decline predicted by Gary Palmero of Oppenheimer & Co. to a 2.5% gain projected by Rogers, with a concensus forecast of a 0.3% rise.

With industry capacity expected to grow about 3% this year after a 2.5% increase in 1981, such forecasts indicate lower operating rates. Thomas P. Clephane of Morgan Stanley & Co. looks for "a third consecutive year of sluggish operations," with operating rates coming down from 93.6% in 1979 to 90.0% in 1980 to 89.4% in 1981 and 87.6% estimated for 1982. "The 87.6% figure would be the second-lowest recorded operating rate since 1962, and would be substantially less than the 92% to 93% level that the industry has historically needed to keep prices in line with rising costs."

Palmero expects operating rates to decline to 86% to 88% during the downswing, which he expects to last from October 1981 through March 1982. At that level, he says it "will be extraordinarily difficult to pass along price increases to maintain profit margins. In fact, there is a reasonable risk that well-established price levels might give way across the board."

In the second half of 1981, there was already some resistance to new price increases, while discounting was noticeable in hardwood pulp, uncoated white papers and export linerboard. For all of last year, paper industry prices were up on the average about 8% to 9%, and the consensus estimate by analysts for this year is around a 7% rise.

Among individual grades, Evadna S. Lynn of Merrill Lynch, Pierce, Fenner & Smith expects the operating rate for uncoated free sheet papers to drop from 91.7% last year to 90.7% this year, "precluding an across-the-board price increase in that general category until the fall of 1982." She doubts the newsprint price increase for March 1 "will hold unless there is a prolonged strike in eastern Canada next spring." The recent weakening in the economy "postpones the previously expected tightness in linerboard operating rates until mid-1983, thereby eroding prospects during 1982 for price increases in excess of cost increases."

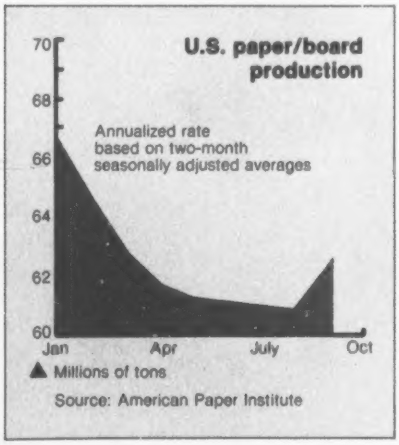
Pressure on profit margins

Analysts expect production costs per unit to decelerate from around a 9% increase in 1981 to about 8% this year, but this would still be higher than the expected increase in paper prices, resulting in some pressure on profit margins.

Rogers, for example, expects fiber costs (which represent 30% of total industry costs) to rise about 8% this year "because the relatively low level of projected housing starts should take significant pressure off all timber markets this year." He also expects labor costs (25% of

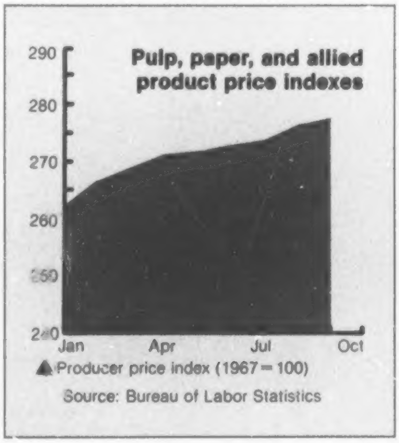
HOW U.S. PAPER INDUSTRY PERFORMED IN 1981

Production held steady through most of the year . . .



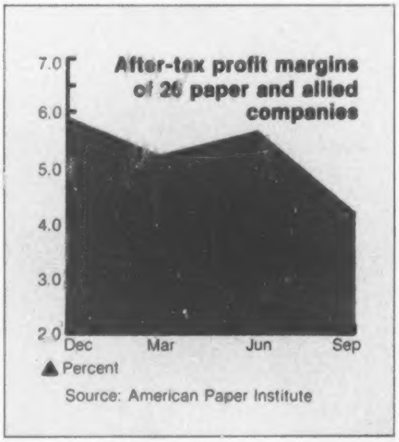
Source: American Paper Institute

. . . prices lost momentum in the second half. . .



Source: Bureau of Labor Statistics

. . . profit margins showed pressure in third quarter



Source: American Paper Institute

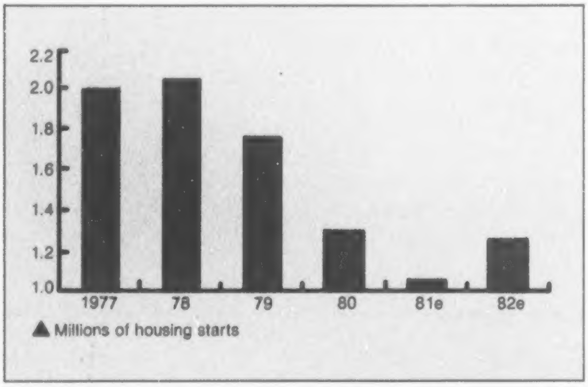
total) to increase 8%, and energy (20%), chemicals (5%) and freight (10%) to all rise about 10%—although the rise for the last two may be less.

As a result of this margin squeeze, analysts on the average expect paper industry operating profits (excluding extraordinary and nonrecurring items) to decline 2% this year. Individual estimates for 1982, however, vary from −15% projected by Palmero and −10% to −15% estimated by Lawrence Ross of Paine Webber Mitchell Hutchins Inc. to a +18% forecast by Rogers.

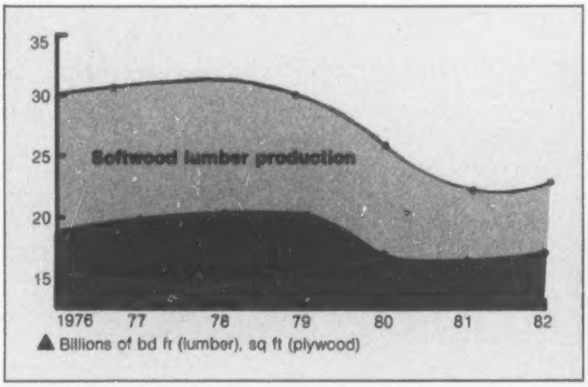
Adler, however, expects the performance of some paper companies "to diverge substantially from the 1982 trend." Among companies that will perform better this year are those with major capacity additions reaching full production and companies that have completed major energy-cost reduction projects. Some companies also stand to benefit from new expansion programs just beginning, on which investment tax credits will rise and on which more prestartup interest costs can be capitalized under new accounting rules, according to Adler and other analysts.

THE DISASTER IN HOUSING

Housing starts have been in free-fall for three years . . .



. . . and not much improvement is seen for wood products in 1982



Source: National Forest Products Assn. estimates

Disaster in wood products

"Although economic projects in early 1981 had assumed interest rates would decline and housing industry recovery would begin in the third quarter, the opposite conditions actually prevailed," George H. Weyerhaeuser, president and CEO of Weyerhaeuser Co. said recently. "Housing starts fell to one of the lowest annualized rates since World War II, in the face of 18% mortgage rates."

He estimated U.S. softwood lumber production in 1981 will total 24.5 billion ft², "the lowest level the industry has seen since the 21.1 billion of 1945, with plywood production also at extraordinarily low levels." At the beginning of the fourth quarter, an estimated 42% of the inland U.S. lumber industry was idle, 29% of the West Coast, 31% of the South and 25% of the British Columbia industry. In addition, an estimated 35% of western and 17% of southern plywood capacity was down.

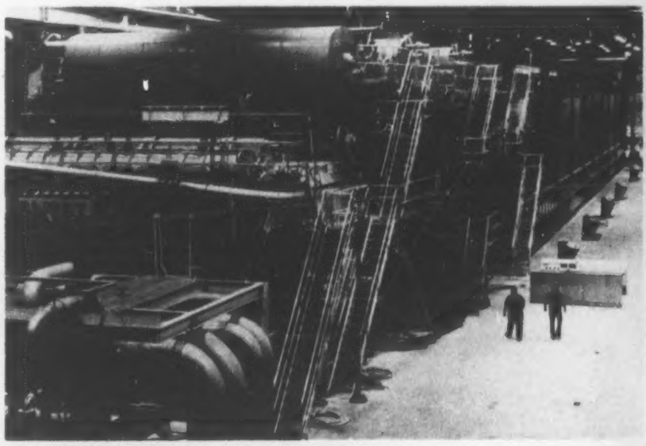
"Prices of many building materials dropped to new lows" last fall, noted W.A. Franke, president and CEO of Southwest Forest Industries, who doesn't see major improvement "until mortgage rates move below 14%."

Most analysts are projecting housing starts of around 1.3 million this year compared to 1.1 million last year. National Forest Products Assn., which sees "no solid evidence to suggest interest rates will come into the range where mortgage lending becomes attractive and borrowing becomes affordable," is forecasting 1.25 million housing starts in 1982. It projects U.S. softwood lumber production will rise only 4.4% this year, while softwood plywood production will increase 7.3%.

On the average, analysts estimate forest products earnings will rise 64% this year. Individual projections range from +12% to over +200%, with the variation partly due to whether estimates include some income from paper operations. The increase is from a depressed base, after a 30% to 40% drop in 1981 earnings and a substantial decline in 1980.

Capital spending shows resilience

The depressed cash flow from wood operations has caused some forest products companies to defer or stretch out their pulp and paper capital spending programs. Based on an analysis of some leading companies' spending plans for next year, Bruce Kirk of Goldman Sachs estimates that while forest products producers' to-



"The Chief" started up at Mead, Chillicothe, Ohio, last year.

tal spending budgets will be down 26% this year, paper companies' outlays will rise 5%. "For the first time since at least 1968, the paper/paperboard companies' expenditures will top the wood product companies' that, historically, have redeployed their inflating western timber profits into paper/paperboard plant."

PULP & PAPER estimates U.S. paper industry capital spending will fall slightly this year to $6.50 billion from $6.54 billion Commerce Dept. estimated for 1981. McGraw-Hill's latest survey found paper companies will raise outlays from an estimated $6.61 billion in 1981 to $6.86 billion in 1982 and $7.88 billion in 1983 (+14.8%).

Longer-run outlook bright

If economic growth returns to anywhere near normal levels, the longer-run outlook for the paper industry looks bright. Data Resources Inc., for example, projects that following a 0.5% decline this year, real GNP will grow 4.4% in 1983 and 4.2% in 1984. With paper/board production following this economic trend and industry capacity growth slowing to perhaps 2% or less in 1983-84 due to project deferrals, operating rates and profit margins should show substantial improvement next year.

Paper/paperboard exports were down around 10% last year from 1980's record level of 4.5 million tons, and will probably show only moderate improvement in 1982. European Community has been projecting only 1% to 2% real economic growth this year, but with the recession in the U.S., this estimate may now be high. Japan is expected to show only 4.0% growth for its fiscal year ended March 31, but may show somewhat better performance in its next fiscal year. Longer-run, however, U.S. export shipments of paper and paperboard should grow twice as fast as domestic demand, reflecting low cost position of U.S. mills and capacity curtailments overseas.

The wood products side of the industry is also expected to show longer-term improvement, with DRI projecting housing starts of 1.3 million in 1982, 1.7 million in 1983, and 1.8 million in 1984.

UNCOATED FREE SHEET

Turnaround at last

Soft uncoated free sheet markets will begin to firm up in the second and third quarters of 1982 after a year in which demand got increasingly soggy and price discounting became widespread, analysts believe. And industry executives point to forms bond and xerographic papers as among the market sectors likely to lead to strong uncoated free sheet growth in the next few years.

Actual operating rates of uncoated free sheet mills in most of 1981 were not disastrous. Mills ran at 92.1% in January and were still operating at 90.9% in August, executives estimate, with production only off by 0.9% for the first eight months of the year. But some weaknesses were showing up even then: bond and writing shipments through August had slipped 2.9% from a year earlier, while offset paper in rolls was down 1.7% and envelope stock 2.0%, one executive noted. About the only bright spot he could find was a 4.2% increase in forms bond.

Looked at by end-use, he added, there were indications of where weakness in free sheet was coming from. Paper for reprographics had dipped 7.5% and free sheet shipments to book publishers were 5.1% lower than a year earlier.

Executives don't expect all of those soft spots to disappear in the next year. Overall uncoated free sheet production will rise only 2% in 1982, bringing an operating rate that is largely unchanged at 91% or 92%, according to Mead Paper market research manager R.L. Ordeman. Champion International Corp. vice president Bartley Reitz thinks the operating rate could get as low as 87% in the first quarter before improving with the U.S. economy to 94% by year-end; he still only expects a 1.5% increase in uncoated free sheet production for the year.

L.F. Rothschild, Unterberg, Towbin analyst Mark Rogers, who sees a 93.6% operating rate this year, thinks production in the first quarter will edge down 1.1% from

WHAT ANALYSTS ARE PROJECTING FOR 1982

	Percentage change from 1981 levels							
	Growth in real GNP	Paper/board[1] production	Operating rates[2]		Paper/paperboard prices	Costs per unit output	Operating profits[3]	
			Paper	Paperboard			Paper firms	Forest Prod.
George B. Adler Smith Barney	−0.6%	−1.3%	88.0%	87.5%	+7.0%	+8.0%	−10.0%	+40.0%
Thomas P. Clephane Morgan Stanley	+0.7	+1.0	89.5	89.0	+5.0	+6.3	−6.0	+12.0
Bruce Kirk Goldman Sachs	−0.4	−0.3/ −0.5	87.0/ 88.0	87.0/ 88.0	+8.0/ +9.0	+8.5/ +9.5	+6.0	+10.0/ +12.0
Evadna S. Lynn Merrill Lynch	0.0	+0.5	89.7	88.0	+7.1	+7.9	+5.7	+219.0
Gary Palmero Oppenheimer	0.0/ +0.5	−1.8	90.0	88.5	+5.8	+7.2	−15.0	+25.0/ +35.0
Mark Rogers L.F. Rothschild	+2.5	+2.5	91.7	91.4	+9.8	+8.2	+18.0	+45.0
Lawrence Rose Paine Webber	+0.4	+1.5	89.0	91.0	+6.0/ +8.0	+8.0/ +9.0	−10.0/ −15.0	+75.0/ +100.0
Average	+0.4	+0.3	89.3	89.0	+7.2	+7.9	−2.0	+63.6

1 Includes construction grades, in most cases. 2. Production as percent of capacity. 3. Excluding extraordinary or nonrecurring items. Most analysts include firms like International Paper, Union Camp, Westvaco, etc. in paper earnings category and companies like Weyerhaeuser, Georgia-Pacific, and Louisiana-Pacific in forest products. Merrill Lynch and Paine Webber estimates for paper exclude wood products contributions, while forest products estimates are for building materials only.

New U.S. printing/writing paper capacity through 1984

Announced projects	Location	Capacity (000 tons)	Startup
Coated groundwood (Nos. 4 and 5)			
Boise Cascade	Rumford, Maine	160	1981
Consolidated	Wisconsin Rapids, Wis.	14	1981
Nitec	Niagara Falls, N.Y.	70	1981
Mead	Escanaba, Mich.	200	1982
St. Regis	Sartell, Minn.	168	1982
Weyerhaeuser	Columbus, Miss.	175	1982
Coated free sheet (Nos. 1 to 3)			
Plainwell	Plainwell, Mich.	11	1981
Scott (S.D. Warren)	Skowhegan, Maine	200	1983
Uncoated free sheet			
Crown Zellerbach	Wauna, Ore.	30	1981
Mead	Chillicothe, Ohio	150*	1981
Willamette	Hawesville, Ky.	100	1982
Champion	Courtland, Ala.	150	1984
Crown Zellerbach	Camas, Wash.	160	1984
Union Camp	Eastover, S.C.	210	1984
Weyerhaeuser	Columbus, Miss.	200	1984

*Net improvement is 75,000 tpy

the same period of 1981. He also thinks the industry will do slightly better on pricing than it did in 1981: he forecasts an 8% improvement in prices for 1982, compared with a 7% rise in 1981.

Once the economic downturn begins to reverse, low inventories will give uncoated mills a quick boost, executives believe. Reitz pointed to both an inventory correction and an increase in copier sales as strong points for reprographic paper demand in the second half. Ordeman agreed that demand for both reprographic and bond paper has been "masked by inventory draw-down in both the end-user and distribution-channel levels." But he also noted that "the heavy increases in cut-size capacity over the past year will hold back a real strengthening in cut-size until the third quarter."

Offset and other book papers will bounce back with the economy, Reitz said, while "envelope papers will do better because of the successes in direct mail target advertising." Ordeman also sees uncoated book grades picking up "strongly with the end of the recession," but adds they will "show only modest growth over the next five years as the demand for higher quality printing results in a swing toward coated in an increasing number of jobs." Also inhibiting book paper sales over the next few years will be the "changing school enrollment," Reitz noted.

At the same time, the increasing dependence of business on instant information will be a factor in the anticipated strength in forms bond and reprographic papers in the next few years, executives believe, with Reitz noting that "the proliferation of small computers will help the forms market. Their individual paper consumption will be modest, but the number of machines will be enormous, especially as they move into small businesses and the home." Initially, however, home computers will probably use specially treated papers more than forms bond, Reitz said.

Free sheet mills will need all the help they can get going into the mid-1980s, with a significant jump in capacity likely in 1984. In that year, 720,000 tpy of capacity is scheduled to come on-line, coming after no increase in 1983 and only 100,000 tpy of new capacity in 1982.

COATED PAPER

Some downtime; demand firm

Coated paper demand will recover solidly from the 1981-82 recession if the downturn doesn't last much beyond mid-year, but the upswing will look very different to coated free sheet and coated groundwood mills. Free sheet mills will run virtually full-out during the second half, while groundwood mills will have trouble finishing the year much above an 85% operating rate, industry executives believe.

The key difference between free sheet and groundwood, observers say, is that groundwood capacity is in the middle of a dramatic surge while free sheet capacity is largely static. Indeed, free sheet manufacturers plan only one addition in the 1982-84 period, a 200,000-tpy machine Scott Paper Co.'s S.D. Warren Div. is installing at Skowhegan, Maine, in 1983. By contrast, coated groundwood capacity rose 206,000 tpy in 1981 and is going up 543,000 tpy in 1982. R.L. Ordeman, Mead Paper market research manager, predicted the coated groundwood capacity bulge will not be fully absorbed by the market until 1985.

Highlighting a picture of healthy demand and a mixed operating rate, St. Regis Paper Co. senior vice president James Bowersock forecasts some industry downtime and a coated groundwood operating rate of 84% to 85% for 1982. He also thinks coated groundwood prices will not keep pace with inflation but will "rise in the 6% to 9% area" in 1982. Ordeman believes the groundwood operating rate will be "in the high 80s"—in contrast with a coated free sheet rate of 95% to 96%.

Recovery will pull free sheet operating rates up, and "inventory corrections will speed the recovery once it starts" for both free sheet and groundwood, Champion International Corp. vice president Bartley Reitz believes, but the groundwood capacity bulge will prevent groundwood from enjoying high operating rates as a result. He expects free sheet operating rates to bottom out in the first quarter at 93% and groundwood at 88%. But from there on, the path of the two groups will diverge, he predicts: free sheet mills will be running at 98% at year-end, with flat capacity limiting shipments to a growth of only 1%, while groundwood mills will be running below the 88% of the first quarter with shipments for the year rising by 3%.

Fundamental demand for both groundwood and free sheet remains strong, most observers say. Bowersock believes rising postage costs "will cause magazine publishers to seek the less-expensive No. 5 grade, especially the lighter-basis-weight paper."

Some publishers and commercial printers were forced up to coated free sheet or over to uncoated paper in the 1970s due to a lack of available coated groundwood supply, and most executives believe that trend is reversing. Reitz feels No. 5 "has already taken back lighter-weight free sheet business lost in the 1970s," and believes the 100,000 tpy of business lost by uncoated groundwood mills to coated groundwood in 1981 will be roughly duplicated in 1982.

New potential applications will be a growth area for groundwood in the future, according to Bowersock, and Ordeman predicted that "the low end of the free sheet coated grades will feel some impact from groundwood coated mills who can produce weights above the No. 5 publication level and at a competitive brightness with No. 4 grades."

Bowersock also indicated coated groundwood use in commercial printing will increase in the next five years, rising from a healthy 412,000 tons in 1981 to between 570,000 tpy and 620,000 tpy by 1986. Overall commercial printing activity involving all papers was up 2.6% for the first nine months of 1981, Ordeman noted, "a fairly strong showing in an uncertain economy."

Both the high (Nos. 1 and 2) and low (No. 5) grades of coated paper will continue to outperform the middle grades, most observers believe, although the "much larger capacity base of the middle grades" will allow the Nos. 3 and 4 to act as a second-choice alternative to high-grade coated for commercial printing when the higher grades are unavailable, Ordeman said.

Free sheet mills will benefit from the fact that "advertisers now know that target marketing sells high-ticket, high-quality products more effectively than any other medium," according to Reitz. Noting that "many advertisers assert catalog sales are immune to recessions, especially in the top half of the market," he predicted both catalogs and direct mail marketing uses for coated free sheet will be a growth area.

LINERBOARD

Bright prospects beyond slump

Rising inventories, temporary shutdowns and some price shaving were all indications of growing weakness in the U.S. linerboard market late in 1981. But most forecasters expect demand to pick up by the second half, and longer-run prospects remain bright due to limited capacity additions, steady domestic demand growth, and new overseas markets.

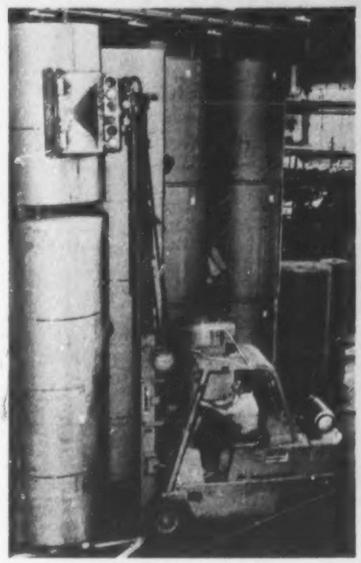
Through the first three quarters of 1981, linerboard mills ran near full capacity, with steady demand from domestic corrugated box plants offsetting growing weakness in export shipments. Unbleached kraft linerboard production through September was up 4.5%, despite a 22.4% decline production for export, according to American Paper Institute figures.

The sharp decline in exports reflected weakness in the economies of Western Europe and Japan, higher value of the U.S. dollar, and reduced level of shipments to People's Republic of China, which imported more than 300,000 tons of linerboard (including bleached) in 1980.

Still, some of the increase in total linerboard production last year reflected inventory building, with containerboard stocks at box plants and mills rising from a Feb. 1 low of 1.96 million tons to 2.45 million tons—6.7 weeks of supply—Oct. 1, according to Fibre Box Assn. data.

Growing weakness in the market was reflected in unsuccessful attempts to raise linerboard prices from the $300/ton level reached at the first of the year and by increasing reports of mills taking market-related downtime in the third quarter. "Current economic conditions have resulted in a moderate easing of demand for paperboard and corrugated containers," Roger W. Stone, president and CEO, Stone Container Corp., told shareholders.

Linerboard demand should begin to recover toward mid-1982, with S.P. Moscarello of Merrill Lynch Economics forecasting a 0.7% decline in box shipments in the first quarter, followed by increases of 3.9%, 3.0%, and 5.7% for the next three quarters. For all of 1982, Merrill Lynch forecasts a 3.0% increase in box shipments to 256.6 billion ft².



Inventories rose last year.

Norma Pace, senior vice president, American Paper Institute, expects linerboard production to show about a 3.5% gain next year, tracking the projected growth in box shipments. Mark Rogers of L.F. Rothschild, Unterberg, Towbin is less optimistic about real GNP growth, and expects linerboard production to rise only about 0.2% next year, not showing a sizable gain until the fourth quarter.

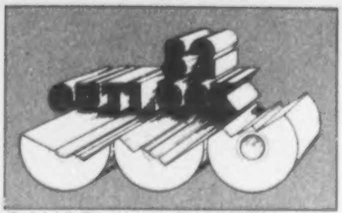
With a large slug of new capacity coming on line late in 1981, he expects operating rates to decline to 94% in 1982, compared to 97.5% in 1981. St. Regis Paper Co. planners are also projecting linerboard operating rates in the 94% to 95% range this year.

Fourth-quarter 1981 startups included International Paper Co.'s new mill at Mansfield, La., with capacity to produce 460,000 tpy of linerboard and 270,000 tpy of semichemical medium, as well as Stone Container's new 105,000-tpy liner machine at Florence, S.C.

But no other major capacity additions have been approved beyond Weyerhaeuser's new 200,000-tpy machine scheduled to start up at Valliant, Okla., this year. Approval of Georgia-Pacific's proposed new liner machine for the Crossett, Ark., or Palatka, Fla., mills, and of Champion International's new mill for Jasper, Texas, will probably be delayed because of depressed earnings. And International Paper Co. may close down or convert about 300,000 tpy of linerboard capacity at Georgetown, S.C., to bleached pulp and paper.

As a result of this slow capacity growth, the liner market should become extremely tight in 1983-84 with anything near normal growth in domestic demand, and most analysts expect linerboard prices to rise sharply. This should greatly improve the profitability of producing linerboard, which at current price levels has a gross margin of only about $30/ton vs about $140/ton for bleached kraft pulp and $100 for newsprint, W.A. Copeland, of Copeland Economics Group Inc., estimated.

With Swedish and Japanese producers concentrating on higher-value grades and the opening of a new market in China, prospects for U.S. linerboard exports are bright, but may be supply-limited. While liner exports (including bleached) will rise from 2.1 million tons (including bleached) in 1981 to 2.25 million tons this year, Rogers said "it is unlikely that 1980's record level of over 2.5 million tons will be surpassed in the forseeable future." He expects export levels after 1982 to level off, "with domestic consumption being a major beneficiary of the modest capacity expansion planned in 1983-84."



CANADIAN INDUSTRY

Canada faces market slowdown in newsprint, groundwood, pulp

Canada's paper industry has just about everything going against it that could possibly face one country in a single year: its major customer, the U.S., is in a recession; its overseas customers aren't doing any better; its competitors have installed new capacity located closer to end-users than the Canadian mills; much of its productive capacity may be closed by strikes just as any economic recovery ought to be getting under way; and it may lose some of the currency advantage which was an important source of profit last year.

By contrast, the U.S. newsprint industry should run practically full-out, and U.S. uncoated groundwood mills will maintain operating rates at least slightly higher than their Canadian counterparts. About the only area where the U.S. and Canada are in the same boat is market pulp, where everybody faces a weak market and some downtime going into 1982.

Yearly increases in the U.S. and Canadian gross national products will be modest in 1982, coming after an equally modest 1981. Forecasts range from the 2.5% U.S. GNP hike in 1982, after a 1% increase in 1981, predicted by L.F. Rothschild, Unterberg, Towbin analyst Mark Rogers, to a 2% downturn Jaak Puusepp of Pemberton Securities in Vancouver, B.C., sees for the U.S. after a 1.8% increase in 1981. And by almost anybody's yardstick, the end of 1981 and first quarter of 1982 look like a low point.

And the Canadian economy may not be in much better shape. Data Resources Inc. expects a 3.7% GNP rise in 1981 to be followed by a 2.1% increase in 1982, while some industry executives are less optimistic—H.L. Martin, British Columbia Forest Products Ltd.'s manager of newsprint sales, expects Canada's GNP to rise by only about 1% for 1982.

Other economic signs don't look any better. Martin expects Canada's consumer price index to rise by 15% in 1982 and CIP Inc.'s W.P. Woodworth thinks the U.S. CPI will top 9% for the year. Executives expect interest rates to remain near present levels, with one executive forecasting a U.S. prime rate averaging as low as 12%, but most staying closer to the 16.5% prime rate forecast by St. Regis Paper Co.'s James Bowersock.

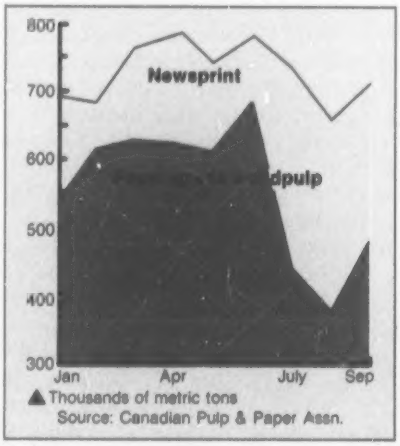
Many Canadian companies, especially in the West, saw 1981 earnings devastated by the slide in North American housing markets, and little relief is expected this year. Rogers estimated U.S. housing starts will rise to 1.2 million in 1982, up from 1.1 million, while a more optimistic Brian Topp, of Montreal-based Jones Heward & Co., still sees only a 1.4-million-start year.

All Canadian mills selling into the U.S. have benefitted from the weak Canadian dollar, but that hedge, too, may be increasingly lost in the next few years. Puusepp feels the Canadian dollar will rise from 83.3 U.S. cents in 1981 to 83.75 cents in 1982, while Topp thinks it could get up to 85 cents this year and 90 cents next year, which "will offset some gains in profitability for Canadian firms in 1983 to the extent each has not dabbled in the forward exchange market."

Ottawa could help the profit picture of Canadian industry through "policies that change exchange rate relationships and tariff provisions," Topp noted, calling both

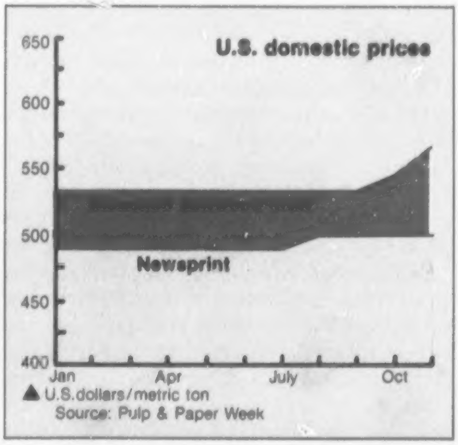
HOW CANADIAN INDUSTRY DID IN 1981

Strike, weakening economy affected shipment levels



▲Thousands of metric tons
Source: Canadian Pulp & Paper Assn.

Newsprint prices rose mid-year, 4th-quarter pulp hike uncertain



▲U.S.dollars/metric ton
Source: Pulp & Paper Week

factors "negatively poised" for now. He also warned that "changes in tax laws lowering the overall corporate rate but discontinuing special incentive and grant programs could be negative."

Perhaps a bigger worry for the industry than exchange rates this year will be the potentially thorny labor negotiations this spring. Union locals in eastern Canada are expected to try to duplicate the 15%/13% contract won by British Columbia workers last year, and Puusepp thinks labor settlements will add $12/ton to newsprint operating costs in 1982. BCFP's Martin expects to see a 17.5% increase in labor costs in the Canadian newsprint industry, in contrast with an 8% increase predicted for the U.S. by St. Regis' Bowersock. Bowersock thinks overall U.S. operating costs will rise by 12% to 13% this year.

Canadian newsprint industry operating costs overall will climb by 15% to 16%, according to Topp, while BCFP's Martin thinks costs could rise by 19.8%, and yet the maximum anybody expects to see in newsprint price hikes this year is $35 to $40/ton. Uncoated groundwood mills are expected to do no better than keep up with inflation, and could also do worse.

All of these factors will force Canadian paper industry profits sharply down. Puusepp foresees a 20% fall in profits this year from 1981 levels, which are already depressed in many cases, and Topp believes Eastern Canadian profits will slip by 30%—and that British Columbia profits will rise only modestly, and then only "if lumber markets improve in 1982."

NEWSPRINT

Losing share to U.S. mills

Canadian newsprint mills will be hard-pressed to approach a 90% operating rate this year, with a worldwide recession coinciding with a dramatic bulge in North American capacity. Puusepp thinks the Canadian operating rate will fall to 83.7% for the year, while BCFP and Topp agree on an 85% rate, and Abitibi-Price Sales Corp. president George Arellano expects the Canadian industry to run at 87% of capacity. Nobody predicted higher than the 90% estimated by CIP's Woodworth and St. Regis' Bowersock, and most executives expect Canadian production to fall by 1.5% to 2% from 1981, to 9.4 million tons.

In contrast, U.S. production should rise by about 2%, most said, with Bowersock forecasting a 4.3% jump, to 5.3 million tons. The U.S. industry will run at anywhere from the 93% operating rate forecast by Abitibi's Arellano to the 96.0% predicted by Rothschild's Rogers, with most grouped around Puusepp's 95%. And the reason for such a strong rate in a recession year?—U.S. capacity is rising by 340,000 tpy in 1982, a 6.5% increase, while Canada is adding 6.6%, or 690,000 tpy of capacity. And U.S. mills, closer to markets, will get a larger share of estimated U.S. consumption.

North American newsprint balance-1982
(000 metric tons)

U.S. consumption (at 1.5% growth rate)	10,350
Less inventory reduction	−200
U.S. demand	10,150
U.S. production (at 93% capacity)	4,800
Less U.S. exports	−275
U.S. production for U.S.	4,525
Demand on Canada plus overseas	5,625
Less imports from overseas	−25
Demand on Canada from U.S.	5,600
Plus Canadian demand	+1,075
Plus Canadian exports overseas	+1,900
Canadian production (87% operating rate)	8,575

Source: Abitibi-Price

That consumption rate is not likely to grow very rapidly in this recession year, unfortunately. Rothschild's Rogers sees a 2.6% growth rate, while Abitibi's Arellano thinks it will rise only 1.5% to 11.4 million tons. Some regions of the U.S. will do better than others, with BCFP's Martin expecting a 3% growth in the southern states in contrast with 2.4% elsewhere in the U.S. Another executive forecasts a 1% to 2% growth in the Midwest, rising to 2% to 3% in the Pacific Coast, while Woodward thinks consumption in the Northeast will edge up 2% and Bowersock expects demand from the Sun Belt states to continue growing fastest. Canadian consumption should rise 3.5% according to Arellano or 4% to 5% according to BCFP's Martin.

Export markets will give some help at least through the first three quarters, according to Arellano, who expects Canadian overseas shipments to jump 10%. "Mexico should remain a steady market," he said, while Bowersock also pointed to Mexico as a promising market for St. Regis and other southern U.S. producers. On the other hand, nobody predicted exports will offset lost U.S. markets, and Topp noted Scandinavians will be giving Canada "fierce" competition for the important European market. At the same time, BCFP's Martin expects new North American capacity to cut Scandinavian penetration of the U.S. market slightly to below 45,000 tons, and he feels the People's Republic of China will buy more than 80,000 tons from North America—120,000 tons below the estimate of another newsprint executive who asked not to be identified.

Canadian mills could get a little help from machines being idled or converted. Puusepp estimated 100,000 metric tons of newsprint capacity would be idled during 1982, and Arellano said that in addition to 100,000 to 150,000 tons of idled capacity, he expects to see 100,000 tons of capacity upgraded to other products. CIP's Woodworth said he doesn't think any capacity will be upgraded, while another newsprint executive went so far as to predict 1.2 million tpy of capacity being shut down or converted, in a worst-case scenario.

Part of many executives' worst-case scenarios is a prolonged strike in eastern Canada, but newsprint mills outside of eastern Canada would benefit from a strike that lasted for even as short a time as a month. Inventory levels have been sliding since the British Columbia strike and Arellano and Martin predicted that will continue in early 1982, although Martin expects to see newspapers begin stocking up once again late in the first quarter in anticipation of an eastern Canadian strike.

Pemberton's Puusepp thinks consumer stocks will end the year 100,000 metric tons above late 1981, while Arellano predicts a sharp third-quarter draw-down and a level in late 1982 that is 200,000 tons below year-earli-

Newsprint operating cost increases forecast for 1982

Item	U.S.[1]	Canada[2]
Labor	8%	17.5%
Energy	20	20
Wood/fiber	14	15
Transportation	n.a.	20.7
Chemicals	17	n.a.
Other	9.8	n.a.
	12-13%	15.8%

n.a. = not available
Source: [1]St. Regis Paper Co. [2]British Columbia Forest Products

er figures. The outcome of that disagreement will also have alot to say about what kind of price increase the industry gets this year. Jones Heward's Topp expects to see a $35/metric ton increase in the spring followed by an attempted $20 hike in the summer, but doubts the second increase will fully hold.

Canadian mills will be restrained in seeking higher prices by weak demand, some executives believe, but Puusepp thinks U.S. mills will be under no such constraints and "will attempt to become price leaders in their domestic market." He expects to see prices end the year about $535/metric ton, $35 higher than the beginning-of-the-year price, while two others expect the recently announced price of $540 hold by year's end.

UNCOATED GROUNDWOOD

Demand flat for year

Uncoated groundwood mills face demand levels that are likely to be unchanged from 1981, observers believe, with U.S. mills possibly enjoying a slight competitive advantage because of greater proximity to major markets. But both U.S. and Canadian industries will run "in the low 90s," according to CIP's Woodworth, while Rothschild's Rogers predicts an operating rate for the U.S. industry of 89.7%.

If proximity to markets is an important factor in this recession year, another executive who asked not to be identified could be right in predicting a Canadian operating rate of 90% and a U.S. industry running "full." He also sees a 3% increase in North American production, while Woodworth expects "little change" in output.

Despite the geographic advantage of U.S. mills, Canada will continue to capture market share in the U.S. due to the relatively flat capacity picture in the U.S. and the significant number of Canadian newsprint machines liable to be upgraded to groundwood specialties in the next few years.

If machines are converted, executives don't expect that to have any impact on capacity figures in 1982, although Woodworth indicated there could be conversions announced in 1982 that would take effect by 1984-85, and also pointed to Abitibi-Price's planned 1983 conversion of its Beaupré, Que., newsprint mill to groundwood. Jones Heward's Topp mentioned potential conversion of CIP mills to groundwood.

No new U.S. capacity is expected to come on-line in 1982, and the only machine even mentioned is a 155,000-tpy unit considered by ISA International for a proposed new mill in Alabama—and that machine would not start up until the late 1980s, if ever.

In the U.S., the only major capacity addition has been the 165,000-tpy machine producing supercalendered paper at Madison Paper's Madison, Maine, mill, which came on-line in late 1981. Despite the relatively flat capacity picture, however, U.S. uncoated groundwood mills were running at 93% or below in November 1981, and one executive noted that shipments year-to-date were 3.6% lower, while orders received were off 4.3% and unshipped orders had slid by 15.2%, indicating a soft market that was getting weaker. Madison's new machine did not come on at a good time from the point of view of the market as a whole, although the company was optimistic about keeping the machine busy. One observer noted the machine will displace about 15,000 tpy of paper that was being imported from Finland by mill co-owner New York Times. The only other U.S. producer of SC paper is St. Regis, which has a capacity of about 117,000 tpy.

Woodworth thinks the SC market will be "soft to medium" in 1982, and Topp predicted "supercalendered papers probably will have to await the next upcycle before being able to obtain a permanent place in paper markets in North America. Today's soft market conditions in all printing grades make supercalendered's price advantage over coated grades and its quality advantage in super news grades less distinct than will develop in a tight market as printers and publishers continue to downgrade."

Indeed, that position as a middle grade between lightweight coated papers and newsprint is a major problem for uncoated groundwood in a year when recession is combined with overcapacity in competing grades. Woodworth noted that "overcapacity in coated groundwood will enable some upgrading to occur," and Champion International Corp. vice president Bartley Reitz predicted that 100,000 tons of orders lost by uncoated groundwood mills to coated groundwood in 1981 will probably be repeated in 1982.

U.S. uncoated groundwood shipments to magazine publishers through August were up 1.4%, another executive pointed out, but shipments to catalog publishers had slipped by 5.4%, representing a loss of about 20,000 tons. At the same time, coated No. 5 shipments to catalog printers were up 20.3%, representing a gain of 35,000 tons. Uncoated groundwood shipments to commercial printers fell by 30,000 tons, or 19%, with coated No. 5 shipments edging up 4000 tons, or 1.3%.

But the news wasn't all bleak for uncoated groundwood mills, and an executive with mills in Canada predicted groundwood forms paper production will jump by 10% this year, with roto news shipments rising by 5%. Indeed, uncoated groundwood shipments to forms manufacturers by U.S. mills through August rose 21%, to an annual rate of better than 250,000 tpy, and most observers believe growth will remain in the double-digit area for two or three more years at least.

The U.S. roto market, hurt by an 8% cut in page sizes by U.S. publishers in late 1981, is still likely to grow from around 750,000 tpy in 1981 to 900,000 tpy by 1985. And with U.S. production not expected to grow by more than 70,000 tpy by 1985 from the 250,000 ton level of 1980, Canadian mills will still supply the lion's share of North American needs.

More discounts, downtime

Business was bad and getting worse for market pulp mills going into 1982, and most observers believe the situation won't begin to improve before mid-year. Until then, market pulp mills will have trouble making current list prices stick, and some will be forced to take extended downtime to avoid accumulating inventory.

With both domestic and export markets in a recession, U.S. market pulp mills will run at 89% in 1982, down from 95.2% for 1981, Pemberton Securities' Jaak Puusepp forecast, while he expects Canadian mills to run at 90.5%, down from 96%. An industry executive estimated both U.S. and Canadian mills will run at no more than 92%, with hardwood mills doing worse.

At the same time that demand for market pulp is falling, Canadian producers are adding substantially to capacity next year. Canadian market pulp capacity is scheduled to rise by 512,000 short tpy in 1982, with Quesnel River Pulp's export-oriented 175,000-tpy market TMP mill in Quesnel, B.C.—which came on-line in November 1981—the biggest single addition. Northwood Pulp & Timber's 280,000-tpy bleached softwood expansion at Prince George, B.C., is also scheduled to start up in 1982.

The same cannot be said for the U.S., however, where capacity will remain flat in 1981. In fact, only two new market pulp mills are expected to be built by 1985-86 in the U.S.: Champion International Corp.'s 260,000-tpy hardwood pulp mill at Quinnesec, Mich., and a 315,000-tpy kraft pulp mill planned by Great Northern Nekoosa and Finland's Kymi Kymmene.

In addition to new capacity in Canada, the pulp industry is hurt by the weakness of the U.S. and European economies, not expected to begin a recovery before the second quarter or even the middle of the year. Puusepp doesn't think Europe's economic recovery will get under way much before the fourth quarter of 1982, while Jones Heward's Topp thinks overall exports from North America will pick up "hopefully by 1983." Puusepp expects the U.S. GNP to slip by 2% this year, and he thinks Canadian paper-grade chemical market pulp production, at 6.75 million short tons, will be 3.8% lower than 1981. He also expects the U.S. industry to slump, producing 4.2% less at 4.67 million tons.

People's Republic of China, which some had hoped would absorb a bit of the world pulp glut in 1982, will probably not consume as much as expected, said one observer, who estimated China will buy at the same level as in previous years—about 400,000 metric tons, 300,000 of which will probably come from North America.

Perhaps the only silver lining perceived by Puusepp is an anticipated firming in Japanese demand for pulp in the first half, which will give Japanese imports a boost. But nobody thinks Japan, by itself, will support a slumping North American industry, and one analyst said the latest price increase is "tottering on the brink of complete collapse."

Discounting from the new list price of $585/metric ton for northern bleached softwood kraft pulp in northern Europe was common going into the new year, and one manufacturer, MacMillan Bloedel Ltd., postponed its fourth-quarter 1981 increase for U.S. and European customers to Dec. 1 due to customer resistance. Some mills claimed they were getting the new prices: Keith Winrow, vice president of Great Lakes Forest Products, told Canadian publications that "there is talk around here of discounting by producers, but we are not." An Abitibi-Price vice president said his company was getting its hike through, but admitted there was "concern" about whether it would hold.

Elsewhere in the market, there was more than mere concern. Discounting showed up first in the export markets, and indeed, hardwood, suffering from discounts of 10% or more currently, was discounted almost as heavily in some spot market transactions a year ago. Now buyers are commonly getting discounts for all grades of pulp, and signs of significant weakness showed up in the U.S. in October, when inventories shot up 103,000 metric tons to 378,000 tons.

Norscan inventories as a whole rose sharply in October, hitting 1.347 million tons compared to 1.171 million tons in September. U.S. paper-grade pulp mills were running at 91.9% of capacity and Canadian chemical woodpulp mills were operating at 84% during that month, with increasing incidents of downtime caused by lack of orders reported.

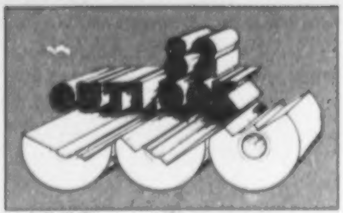
This kind of weakness in production means it will be hard for the industry to keep pace with costs this year, observers believe. Puusepp estimated the latest price increase will not be fully effective until July 1 at the earliest, while Topp said he expects it to take full effect early this year, but to be the only hike of the year.

Hampering efforts to put the increase into effect was soft paper and board production in Europe—as well as, according to PaperTree Economics president Ross Hay-Roe of Vancouver, B.C., a 25% drop in the Swedish currency against the U.S. dollar in 12 months. That virtually gave the Swedes a $700/metric ton price without officially announcing one, he explained, which allows them plenty of room for cutting production to maintain the price—or discounting to gain market share.

And yet costs will rise sharply in 1982. Topp says costs will climb by 15%, or $60/metric ton, with labor, energy, wood and chemicals all climbing at about the same rate. Puusepp forecasts a 30% increase in labor and wood costs, with freight rising 15% and energy and other factors going up 12% each, for a $44/metric ton rise. Southwest Forest Industries estimated U.S. costs will rise by 10% or more each for freight, energy and fiber; 8% or less for other materials; and 8% to 10% for labor.

In spite of higher costs, mills could find prices falling still further from beginning-of-year levels. If discounting reaches $100/metric ton, Hay-Roe indicated, it could wipe out the profits of several B.C. firms, which have already been hurt by soft lumber markets. Oversupply and discounting are expected to plague the hardwood pulp market though much of 1982, but the softwood pulp market, which was not as weak as hardwood at the end of 1982, will firm up as early as the second quarter of 1982, observers say.

Fluff and dissolving pulps were were expected to make a faster comeback in 1982 than most pulp grades. Tembec Inc. president Frank Dottori noted that the fluff pulp market, which many feel has better long-term growth potential than dissolving pulp, held relatively steady until late 1981, while dissolving pulp weakened early in the year. Through August, U.S. dissolving pulp production was down 12.6%, while Canadian output through September was off 11.2% from a year earlier.



LABOR

Labor focus is on eastern Canada

Major strikes are likely to be fewer than normal in the U.S. paper industry this year. The tempo of eastern Canadian bargaining, however, is still uncertain. Industry in both countries will be hard-pressed to be as generous with contract settlements as in previous years. Labor costs are among the expenses industry will try to hold down in an atmosphere of slowing inflation, swelling inventories, and declining demand, analysts say.

Major contracts on Canadian paper industry 1982 labor bargaining calendar

Company	Mill location	Union*	Contract expires
Abitibi-Price	Beaupré, Que.	CPU	4/30
Abitibi-Price	Iroquois Falls, Ont.	CPU	4/30
Abitibi-Price	Pine Falls, Man.	UPIU	4/30
Abitibi-Price	Sault Ste. Marie, Ont.	CPU	4/30
Abitibi-Price	Stephenville, Nfld.	CPU	4/30
Abitibi-Price	Thunder Bay, Ont.	CPU	4/30
Abitibi-Price	Thunder Bay, Ont.	CPU	4/30
Boise Cascade Canada	Kenora, Ont.	CPU, UPIU	4/30
Bowater Mersey	Liverpool, N.S.	CPU	4/30
CIP	Gatineau, Que.	CPU	4/30
CIP	Trois Rivières, Que.	CPU	4/30
Con.-Bathurst	Grand Mere, Que.	CPU	4/30
Con.-Bathurst	Shawinigan, Que.	CPU	4/30
Con.-Bathurst	Trois-Rivières, Que.	CPU	4/30
Domtar	Dolbeau, Que.	CPU	4/30
Domtar	Donnacona, Que.	CNTU	4/30
Domtar Packaging	Red Rock, Ont.	CPU	4/30
Donohue	Clermont, Que.	CNTU	4/30
Gaspesia	Chandler, Que.	CPU	4/30
Great Lakes Forest	Thunder Bay, Ont.	CPU	4/30
James Maclaren	Buckingham, Que.	CPU	4/30
Kruger	Trois-Rivières, Que.	CPU	4/30
CIP	Dalhousie, N.B.	CPU	4/30
Ontario Paper	Thorold, Ont.	CPU	4/30
Price Co.	Alma, Que.	CNTU	4/30
Price Co.	Grand Falls, Nfld.	CPU	4/30
Price Co.	Kenogami, Que.	CPU	4/30
Quebec North Shore	Baie Comeau, Que.	CPU	4/30
Reed	Quebec City, Que.	CPU	4/30
Spruce Falls	Kapuskasing, Ont.	CPU	4/30
Bowater Nfld.	Corner Brook, Nfld.	CPU	5/31
Kruger	Bromptonville, Que.	CPU	5/31
Nova Scotia Forest	Point Tupper, Nfld.	CPU	5/31
Con.-Bathurst	Ville de la Baie, Que.	CNTU	6/30
F.F. Soucy	Rivière-du-Loup, Que.	CPU	12/31
B.C.F.P.	Crofton, B.C.	CPU, PPWC	6/30
CZ Canada	Campbell River, B.C.	CPU	6/30
MacMillan Bloedel	Port Alberni, B.C.	CPU	6/30
MacMillan Bloedel	Powell River, B.C.	CPU	6/30
MacMillan Rothesay	St. John, N.B.	CPU	12/31

*CPU = Canadian Paperworkers Union; CNTU = Confederation of National Trade Unions; PPWC = Pulp, Paper & Woodworkers of Canada; UPIU = United Paperworkers International Union.
Source: Canadian Pulp & Paper Assn.

Precedents set recently by U.S. rail and auto unions may lead American unions to moderate demands. Unions in those industries opened negotiations earlier than usual and settled for pay cuts or smaller pay increases than in previous years, without strikes.

Labor in the U.S. pulp and paper industry appears to sympathize with industry troubles and is amenable to tempering its demands, but in eastern Canada, where the bargaining is concentrated this year, unions are as adamant to gain substantial wage and benefit increases as their British Columbia counterparts were in 1981. "We are brainwashed that industry is broke," said a union source. "We do not believe industry is in bad shape. It's in tremendous shape," he added.

Eager to achieve better contracts in 1982, the Canadian Paperworkers Union has already moved aggressively. Although its precise strategy will not be fully mapped out until later this month, the union last October negotiated improved pension and life insurance plans with Abitibi-Price Inc., a traditional pacesetter in bargaining. The 60,000-member CPU—the largest union to bargain in eastern Canada next year—intends to present the new plans as models in talks with other eastern Canadian mills bargaining in 1982.

Parity with West. Parity with West Coast mills will be the union's foremost priority when bargaining starts around March, a union official said. In 1981, eastern Canadian pulp and paper workers earned an average of C$10.16/hour compared with C$11.46/hour for West Coast employees. In 1982 the margin will widen, as the second year of the West Coast's 1981 two-year contract gives a 13% wage hike to an average of C$12.96/hour.

Unions are expected to use the West Coast settlement as a guide not only in gauging pay parity, but also for such issues as cost of living allowances. These were included in West Coast contracts for the first time last year. COLAs are expected to be an insignificant part of bargaining in the U.S., but in both cases, industry sources say any expectation of winning COLAs is unrealistic.

In eastern Canada, where the current wage is trailing the rate of inflation by more than 4%, unions have not had a COLA clause since the federal government ordered a wage/price freeze in 1975. In the U.S., COLA clauses have nearly disappeared and should be wiped out entirely by the end of 1982, according to American Paper Institute employee labor relations vice president Richard Klinzing. Average wage increases in the pulp and paper industry have kept ahead of inflation, and in 1980, only two COLA clauses crept into the contracts, he noted.

Major contracts on U.S. paper industry 1982 labor bargaining calendar

Company	Mill location	Union	No. of employees	Contract expires
New England Region				
St. Regis	Bucksport, Maine	U,B,A	944	4/30
Intl. Paper	Jay, Maine	U,O	1024	5/31
James River	Jay, Maine	U,O	189	5/31
Scott Paper	Winslow, Maine	U,A,B	586	5/31
Haverhill	Haverhill, Mass.	U	171	6/1
Strathmore	3 Mass. mills	U	470	6/30
Diamond	Hyde Park, Mass.	U	217	7/1
Federal Paper	Versailles, Conn.	U	182	7/10
Great Northern	E. Millinocket/ Millinocket, Maine	U,B,O U,O	2485	7/31
Fitchburg	Fitchburg, Mass	O	192	8/15
Georgia-Pacific	Woodland, Maine	U,A,B,O	560	8/31
Diamond	Old Town, Maine	U	710	9/30
Scott Paper	Skowhegan, Maine	U,A,B	260	9/30
Fraser Paper	Madawaska, Maine	U,O	1042	10/31
Eastern Region				
Westvaco	Tyrone, Pa.	U,B	245	2/17
Nitec Paper	Niagara Falls, N.Y.	O	533	3/1
Mohawk Paper	Cohoes/Waterford, N.Y.	U	201	6/6
Hammermill	Erie, Pa.	U	1344	6/10
Newton Falls	Newton Falls, N.Y.	U	441	8/15
Georgia-Pacific	Plattsburgh, N.Y.	U	555	10/1
Crown Zellerbach	S. Glens Falls, N.Y.	U	279	10/2
Southern Region				
Mead	Kingsport, Tenn.	O	877	1/24
Southwest Forest	Panama City, Fla.	U,B,A	660	2/28
Buckeye	Memphis, Ind.	O	337	3/7
Georgia-Pacific	Port Hudson, La.	U	379	6/5
Chesapeake	West Point, Va.	U	591	6/13
St. Regis	Jacksonville, Fla.	U,B,A	581	6/21
St. Regis	Pensacola, Fla.	U,B	785	6/30
Union Camp	Franklin, Va.	U,O	1213	6/30
Westvaco	N. Charleston, S.C.	U,B,A	964	6/30
Continental Forest	Hopewell, Va.	U	541	7/31
Owens-Illinois	Orange, Texas	U	337	7/31
St. Joe Paper	Port St. Joe, Fla.	U,B,A	650	8/1
Crown Zellerbach	St. Francisville, La.	U	827	8/31
Mead	Lynchburg, Va.	U	353	9/16
Intl. Paper	Vicksburg, Miss.	U,B,O	262	9/26
Mac. Bloedel	Pine Hill, Ala.	U	265	10/4
Arkansas Kraft	Morrilton, Ark.	U	292	10/14
Container Corp.	Brewton, Ala.	U,B,A,O	461	10/14
Intl. Paper	Pineville, La.	U	225	10/14
Tennessee River	Counce, Tenn.	U,B	364	10/27
Intl. Paper	Texarkana, Texas	U,B	564	11/30
Midwest Region				
Simpson Paper	Vicksburg, Mich.	O	226	1/26
Bergstrom	West Carrollton, Ohio	U	195	4/6
American Can	Ashland, Wis.	U	168	4/30
Consolidated	6 Wis. mills	U,A,B,O	2743	4/30
Mead	Menasha, Wis.	U	288	4/30
Champion	St. Paul, Minn.	U	420	5/1
Georgia-Pacific	Kalamazoo, Mich.	U	386	5/1
Nicolet Paper	De Pere, Wis.	U	329	5/31
Diamond	Middletown, Ohio	U	265	6/1
Weyerhaeuser	Rothschild, Wis.	U	577	6/1
S.D. Warren	Muskegon, Mich.	U	741	6/15
Manistique	Manistique, Mich.	U	170	6/16
Appleton	Combined Locks, Wis.	U	539	6/30
Mosinee	Mosinee, Wis.	U	465	6/30
St. Regis	Battle Creek, Mich.	O	530	6/30
Pope & Talbot	Eau Claire, Wis.	U	156	7/15
Packaging Corp.	Filer City, Mich.	O	331	7/19
Brown Co.	Kalamazoo, Mich.	U	1200	7/24
Thilmany Pulp	Kaukauna, Wis.	U	1248	7/31
Champion	Ontonagon, Mich.	U	221	8/1
P.H. Glattelter	Neenah, Wis.	U	375	8/1
Mead Corp.	Chillicothe, Ohio	U	754	8/1
Beckett Paper	Hamilton, Ohio	U	312	9/27
Pacific Coast Region				
American Can	Halsey, Ore.	U B	467	1/31 2/28
Publishers	Oregon City, Ore.	W	346	3/15
Publishers	Newberg, Ore.	W	300	4/1
St. Regis	Tacoma, Wash.	U	466	5/31
Simpson Paper	Pomona, Calif.	W	398	6/1
Simpson Paper	Anderson, Calif.	U	446	6/14

* UPIU = United Paperworkers Intl. Union; A = Intl. Assn. of Machinists & Aerospace Workers; B = Intl. Brotherhood of Electrical Workers; W = Assn. of Western Pulp & Paperworkers; O = Other.

Source: American Paper Institute Employee Relations Dept.

Productivity boost. Despite a pay differential of 27% below their Canadian West Coast counterparts, U.S. pulp and paper workers began indicating their willingness to temper demands last year. Workers at several mills extended contracts for one year without a pay increase, and some settled three-year contracts averaging increases of as little as 8%. The U.S. average wage increase during the first half of 1981 was 8.9%—the first time since 1973 it has fallen below 9%, said Klinzing.

The foremost demand expected from industry's side of the table in this year's talks is a call for increased productivity. Crew and multicraft concepts are two popular means most often mentioned by industry.

Union sources, however, suspect increased productivity is really industry's means of getting unrestrained authorization to replace jobs through automation. CPU has threatened to "battle" attempts to increase productivity. United Paperworkers International Union, the largest union set to bargain next year in the U.S., also views productivity as a threat, but is willing to at least review any proposals. Some 95,000 of its members will be involved in 1982 pulp and paper industry negotiations.

Job security. Unions in both countries also see job security as an important aim in 1982 bargaining. Both will be seeking job guarantees from companies, such as giving employees prior notice of a shutdown, securing other jobs for laid-off workers, and increasing severance pay.

Unlike eastern Canada, where mills tend to follow settlements reached by Abitibi-Price, CIP Inc., or Great Lakes Forest Products Ltd., U.S. bargaining is fragmented regionally, as well as within certain companies which allow each mill to bargain separately.

Bargaining in Southeast. U.S. bargaining will focus this year in the Southeast. Although there are only 24 mills with a total of 11,870 employees set to bargain there, the companies involved are major ones, including International Paper Co., Mead Corp., MacMillan Bloedel Inc., St. Regis Paper Co., and Crown Zellerbach.

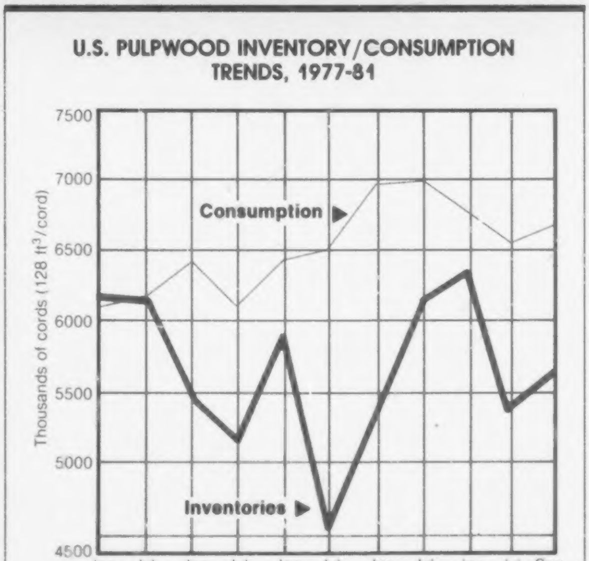
The second-most-significant bargaining region will be the Midwest, where contracts are expiring at 38 mills having a total of 123,726 employees. Bargaining in New England involves 26 mills with a total of 10,053 employees; in the Eastern region, 13 mills with 4114 employees, and on the West Coast, 8 mills with 2613 employees.

82 OUTLOOK

RAW MATERIALS

Pulpwood supply should be ample

U.S. pulp mills had little difficulty obtaining adequate pulpwood supplies last year as operating rates declined in the second half, sending pulpwood inventories higher. The severe downturn in housing also meant reduced competition from lumber and plywood mills for available roundwood supplies. In the West, where the lower flow of residuals from wood products plants could have been a problem, lower export demand from Japanese mills for woodchips kept the market in balance.


U.S. PULPWOOD INVENTORY/CONSUMPTION TRENDS, 1977-81

Source: American Pulpwood Assn.

Through September, U.S. pulpwood consumption totaled 60.4 million cords, off 0.6% from the first nine months of 1980, according to American Pulpwood Assn. Inventories at the end of the month stood at 5.7 million cords, up from the year low of 4.9 million cords in June, but still below the 6.3-million-cord level entering 1981.

Pulpwood costs slow. Stumpage and roundwood costs in the South rose at a rate less than inflation in 1981, reversing the trend of recent years.

As of last September, pine stumpage costs were up an average of 4.8% from a year earlier, while delivered pine and hardwood roundwood costs had shown little change, according to Timber Mart-South data for 13 southern states. The depressed state of the wood products industry was probably a major factor for this decelerating trend, with more than half of all wood products mills nationwide either shut down or curtailed for parts of last year. But a reduced flow of byproduct residuals may have been responsible for a 15.1% jump in delivered pine chip costs in the South.

With pulp production through the first and possibly second quarters of 1982 expected to be soft, pulpwood supplies should continue to be ample. And with not much recovery seen for housing either, pulpwood costs should continue to be weak through mid-year. In addition, harvesting productivity should be boosted by wage settlements negotiated last year and by continuing woods mechanization.

West in balance. In the West, where pulp mills are more heavily dependent on residuals than any other region, a "delicate balance" existed between supply and demand in the fourth quarter, John R. Forrest, senior vice president for timber and wood products, Boise Cascade Corp., told a recent analysts meeting.

While supply of byproduct woodchips from lumber and plywood plants in the region fell sharply, export demand for chips also dropped, reflecting recession and paper mill curtailments in Japan, the largest importing country. Through August, U.S. chip exports were running at an annual rate of 4.6 million tons, down 12.6% from a year earlier, according to Commerce Dept. data.

From a peak of $131/bdu during the mid-1980 chip shortage, chip export prices to Japan ratcheted down quarter by quarter until the second half of 1981, then rose by $2.50 to $102.50/bdu—reflecting reduced chip supply due to lumber and plywood mill curtailments, not improved demand. Nevertheless, chip export prices, which were at $55/bdu in the second half of 1979, currently remain at a historically high level, increasing cost pressures on domestic pulp mills in the region.

Although depressed housing activity may continue to restrict chip supplies in the region, West Coast pulp mills have increased their ability to generate chips from cull logs and this may help prevent another sharp runup in chip costs, according to Forrest.

Future trends. Southern pulpwood consumption is predicted to reach 64 million cords by 1984, up from 53 million cords in 1979, according to an American Pulpwood Assn. survey.

Use of residue chips from sawmill operations is forecast to reach 48% of total consumption by 1984, up from 44% in 1979 and 10% in 1959. Pulpwood roundwood requirements of 30 million cords in 1979 will increase to 33 million cords in 1984. During the period 1979-84, shortwood receipts will be relatively stable at 21 to 22 million cords, while longwood receipts will increase from 8 million to 11 million cords.

According to the survey, there has been a large increase in the number of mills in the South consuming over 800,000 cords/year. In 1977, says APA, only two mills used over a million cords, and 11 mills used over 800,000 cords. If growth projections bear out, this year there will be 10 mills using over a million cords, and 30 mills using over 800,000. And by 1984, 37 mills will be using over 800,000 cords.

Southern pulpwood trends, 1973-84

	1973	1979	1984
Chip usage	32%	44%	48%
Roundwood volume (cords)	32 million	30 million	33 million
Shortwood	—	21 million	22 million
Longwood	—	8 million	11 million
Rail/truck ratio	53% R	53% T	56% T
Whole-tree/energy chips	—	3 million	6 million

Source: American Plywood Assn.

Wastepaper market in free-fall

Weak and sometimes disastrous performances by major end-use markets sent wastepaper into a tailspin in 1981, and demand for paper stock may not improve until mid-1982, observers believe.

Prices have been in a free-fall—except for the low grades, which have already hit bottom—and some dealers worry that if the market does not stabilize before the middle of the year, even the most established dealers will be hurt—which will damage future waste supplies for the paper and board industry, mill executives fear. "There seems to be no pricing at all," said one dealer, complaining of nearly universal discounting.

Many merchants feel they can at least break even by getting rid of paperstock at low prices, said one dealer. "There's an old saying in this business," he said. "You can recover your losses on a cheap sale. But, if you can't sell, you don't have a chance."

Price slide. Some of the excess wastepaper, particularly mixed news and and old corrugated containers (OCC), is being thrown away. Dealers say that at current rock-bottom prices they are not making a profit on the lower grades, and cannot afford to keep large inventories until the price increases.

Prices on the lower grades had dropped $5 to $10/ton in most areas in November, and some was being sold lower than the list price of $25 to $35/ton for No. 1 news and $20 to $40/ton for OCC. Corrugated kraft clippings dropped from about $80/ton in the Southeast to $35 to $45/ton, and was selling in the Northeast for as little as $15/ton, according to *Pulp & Paper Week* data.

The painful slide in wastepaper prices late in 1981 contrasts with Dept. of Commerce consumption figures for wastepaper, which showed a large increase in domestic use through August (see table on next page). American Paper Institute data, which some consider more reliable, show wastepaper consumption by U.S. paper and board mills through August up 4.5% from a year ago—a gain that may be nearly erased by market conditions at the end of 1981.

Construction slowdown. Except for old news, the low grades are expected to be least in demand going into 1982 because of the severe slump in the construction industry, according Paper Stock Institute of America president William J. Flynn Jr. Through September, building paper production was down 8.3%, while insulation board was off 7.7% from the first nine months of 1980, with these grades also feeling the impact of product substitution from glass matt and plastic foam.

Recycled paperboard, largest end-use market for wastepaper, showed some improvement in 1981 over 1980, but mills were still operating in the low 80% capacity range. While increased demand from recycled newsprint producers was moving old news at a fairly steady rate late in 1981, sales were expected to decline at any time due to buyers' large inventories, said Flynn.

Hard white shavings were selling well until October, but were in "distress" by November due to tissue mills' downgrading to colored and white ledger, according to one merchant. The price had dropped $35/ton from a high of $290/ton in October to $255/ton in November, and in some cases shavings were selling for as low as $210/ton—with very little moving even at that price. The price was expected to drop $15/ton in December.

Tissue mills buying. The ledger grades were remaining in steady demand due to consumption by tissue mills, and to a lesser extent, printing and writing paper mills, running relatively well into the last quarter. But ledger prices were starting to decline $5 to $10/ton in the last quarter to $110 to $150/ton for white ledger and $90 to $125/ton for colored ledger in November, and were

U.S. wastepaper statistics
(000 short tons)

	Year-to-date annualized 1981	% change from 1980	Full-year 1980	% change from 1979
Domestic use[1]* (thru Aug.)				
Mixed	2,988	−0.7%	2,686	−7.0%
News	2,390	+18.6	2,116	−0.7
Corrugated	5,705	+10.2	5,628	−1.9
Pulp substitutes	1,353	+7.6	1,301	−7.1
Deinking	1,299	+19.4	851	−0.3
Total	13,733	+9.5	12,583	−3.3
Exports[1] (thru Sept.)	2,323	−16.7	2,664	+19.3
Price index[2] (thru Sept.)	184	−14.1	209	+1.0

* American Paper Institute reported wastepaper consumption by U.S. paper/board mills as follows (000 tons): 14,810 tons through August, up 4.5% from a year earlier; 14,520 for all of 1980, down 5.5% from 1979.
Sources: 1. NARI and Dept. of Commerce
2. Bureau of Labor Statistics producer price index for all wastepaper (1967 = 100)

expected to drop by $10/ton each by year's end.

Softness in the deinking grades is expected sometime early in 1982, however, because publishers' demand for printing was declining late in 1981, and paper mills were taking downtime, said Flynn.

Exports weaken. The only wastepaper grade that showed overall strength in the fourth quarter of 1981 was computer printout for export, but even that had begun to weaken by the end of the year. Most dealers lacked export orders for any grade of wastepaper going into December, and were uncertain when demand from overseas would resume. Nevertheless, U.S. wastepaper exports, which more than doubled in five years to a record 2.7 million tons in 1980, are expected to eventually resume their strong growth.

Through September, exports totaled 1.7 million tons, down 16.7% from their 1980 year-to-date totals. Deinking declined 37.8%, and OCC was down 15.0% from 1980 year-to-date totals, but pulp substitutes were up 5.4%, and news, 3.8%, according to Commerce Dept. figures.

Italy, largest European market for U.S. wastepaper exports, cut off orders last June, and demand from the Far East countries, which were burdened with their own oversupply of paperstock, dropped off during the last half of 1981. Mexico, which has been virtually cut off by a railroad blockade since last summer, is not expected to resume buying U.S. wastepaper for several months.

Decline in overseas shipments is attributed to worldwide economic malaise and the strengthening U.S. dollar, according to Flynn. The wastepaper market has also been hurt by price discounts in market pulp of as much as $50/ton, according to some dealers.

Six-month downturn? Dealers are calling the current wastepaper slump a "recession," and comparing it with several wastepaper downturns since the early 1950s. Each lasted about six months, according to one veteran wastepaper merchant. He expects that by March, the current downturn should begin to improve.

Most dealers are used to the ups and downs of the wastepaper market, but this downturn concerns them because of high interest rates. The cost of money has caused the entire economy to "come to a screeching halt," one noted. If interest rates do not come down to around 12% to 13%, they fear the economy may collapse and take longer than expected to get going again.

Despite the current uncertainty, however, some wastepaper dealers are optimistic about the long-term effects of the current recession. Sources of wastepaper are drying up because prices are too low to make supplying wastepaper profitable. "When the wastepaper market does start to improve," said a dealer, "it will be the best wastepaper business in the world because nobody will have any paper and it will all be at a premium."

No relief in sight for energy costs

The pulp and paper industry should expect across-the-board price increases in all energy sources in 1982, maintaining the pattern set over the past decade. The paper industry's cost of energy relative to the value of its sales has risen steadily from about 7% of the value of sales in 1972 (a pre-embargo year and one of strong economic activity) to an estimated 14.9% of the value of sales in 1981, according to American Paper Institute. The economic incentive for the paper industry to improve its energy efficiency is therefore a large one.

The paper industry has, however, changed the face of its energy consumption picture in the past ten years. The ratio of self-generated fuels to purchased energy sources has changed from a 40:60 split in 1972, with purchased energy sources bearing the burden of energy consumption, to a 52:48 split in 1981, with self-generated and waste fuels being the major fuel source (see table). In addition, while the paper industry has increased its production of paper and paperboard by 14% since 1972, it has reduced its consumption of fossil fuel and purchased energy per ton since that time by 30.1%.

The following outlook for various sources of energy—fuel oil, purchased electricity, coal, natural gas, and self-generated fuel—is based on an interview with Ronald J. Slinn, vice president-pulp, materials, and technology group, American Paper Institute.

Fuel oil. The paper industry is the largest consumer of fuel oil among U.S. manufacturing industries. World oil prices are now controlled by OPEC, and current decontrolled domestic prices reflect international prices.

What 1982 oil prices will do is entirely dependent on OPEC, which recently agreed on a $34/bbl price for oil, in the face of a production cutback by the Saudis by about one million bbl/day. And while it is anyone's guess what OPEC will actually do in 1982, it is dealing with the world surplus of oil that has been talked about for the last year or so.

Purchased electricity. The paper industry is the third-largest consumer among U.S. manufacturing industries of purchased electricity. State utilities commissions are passing on to consumers their justifiable increases in electricity rates, but they are doing it in a way that tends to apply more of the increase to industrial consumers than to households. From that perspective, the cost of purchased electricity for the paper industry will certainly rise in 1982, and reflect the utilities' costs for oil, gas, and coal as well as for other major fuels they use.

Coal. The paper industry is also third among manufacturing industries in coal consumption. Factors which will quickly and effectively affect the price of coal are the costs of alternative fuels.

Natural gas is an important fuel to the paper industry. Although the industry is only sixth among manufacturing industries in natural gas consumption, its use of this fuel has been increasing. In 1981, paper industry use of natural gas increased 8% over 1980.

The pricing of natural gas is still regulated, and there is no prospect that natural gas will be deregulated in 1982. U.S. Secretary of Energy James B. Edwards said last November he would introduce legislation to accelerate decontrol of natural gas by perhaps 1983. But the White House has said that that is not White House policy, and the natural gas deregulation schedule will be completed by 1985.

However, the 1985 deregulation provisions allow any new gas found in deep wells to be free of price control, and there is more and more natural gas being found in this new gas category. This means that industry is, in fact, paying higher prices for natural gas, since a good deal of the newly found gas is in this category. And it appears that the price of natural gas will rise to perhaps an energy equivalent somewhere below the price of oil.

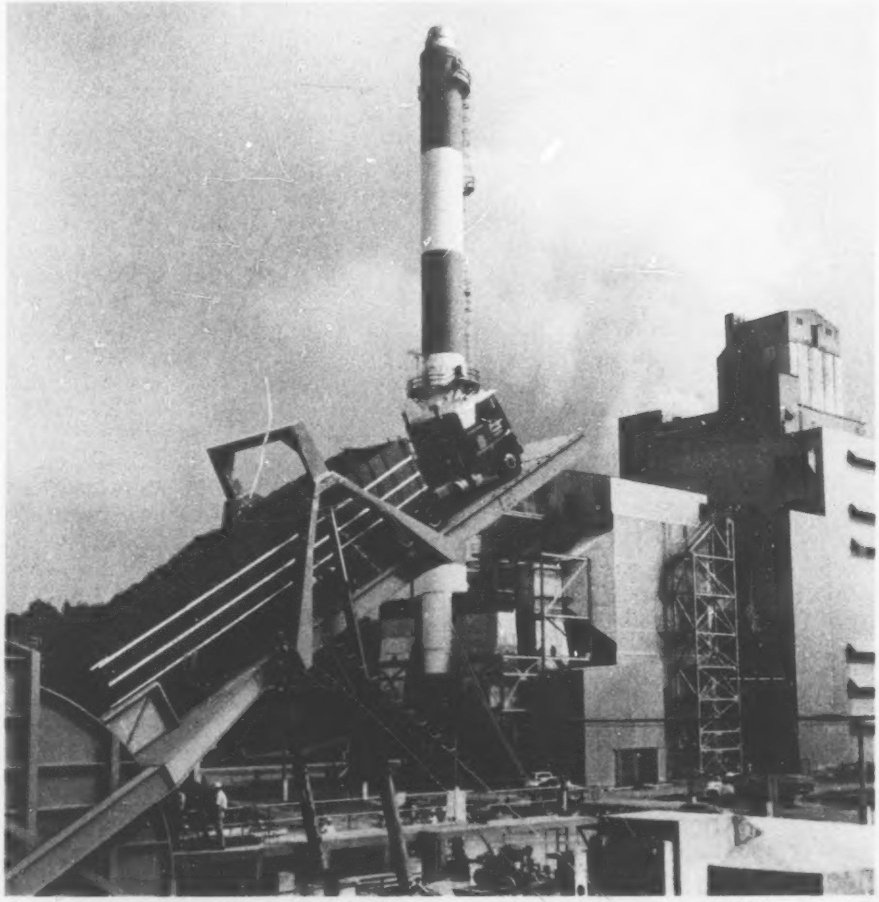
Short-term natural gas supply looks good, even if this winter is colder than usual, according to the Federal Energy Regulatory Commission. The FERC surveyed 28 major interstate gas pipelines and their wholesale customers, and sees sufficient supplies this winter without major natural gas curtailments or plant shutdowns.

Self-generated fuel. The industry relies very heavily on self-generated fuel, and is increasing that dependence each year. Orders for boilers placed by the pulp and paper industry in 1980 indicate that wood residues and spent pulping liquor will be the primary fuels for 71% of the industry's total new steam capacity.

U.S. pulp, paper and paperboard industry estimated fuel and energy use, current, 1980, 1972

Source	Third-quarter 1981	1980	1972
Purchased electricity	6.8%	6.2%	4.4%
Coal	10.8	10.5	9.8
Residual fuel oil	10.6	16.0	21.3
Distillate fuel oil	0.3	0.4	1.0
Natural gas	19.5	17.7	21.5
Other purchased energy	1.0	0.2	1.1
Total purchased fossil fuel and energy	**48.0**	**51.8**	**59.1**
Woodwaste	6.7	5.4	2.0
Bark	5.3	4.8	4.6
Spent pulping liquors	39.1	37.2	33.7
Self-generated hydroelectricity	0.5	0.4	0.4
Other self-generated	0.4	0.4	0.2
Total self-generated and waste fuels	**52.0**	**48.2**	**40.9**
Total energy	**100.0**	**100.0**	**100.0**

Source: American Paper Institute



Bark/woodwaste-burning power boiler saves oil at Westvaco Corp.'s Wickliffe, Ky., mill.

ENVIRONMENT

Outlook dim for big Air Act changes

Relief for industry from the regulatory morass of the Clean Air Act probably will not emerge from Congress this year, but Capitol Hill is expected to pass one bill that will affect the cost of controlling emissions: a new law to control acid rain should get the congressional nod, over stiff industry opposition.

Also on the legislative and regulatory horizon for the paper industry are coming Clean Water Act amendments and pending regulations, along with rules dealing with hazardous wastes and Superfund, the massive waste spill cleanup program.

Paper industry lobbyists had high hopes a year ago that the beginning of 1982 would see action nearly complete on significant revisions in the Clean Air Act. Among the industry's pet projects are: revision of the controversial prevention of significant deterioration (PSD) program; abandonment of stringent lowest achievable emission rate (LAER) standards in "dirty air" areas; and elimination of federally imposed construction bans in areas that show no progress toward attaining national ambient air quality standards by mandatory deadlines.

Partisan bloodletting. What the industry is likely to get out of the current Congress, however, is far less than half a loaf. "It's just not an issue that folks up there want to get involved with, because anything they do can always be attacked as anti-environmental and anti-motherhood," one lobbyist noted.

On top of that, Senate Environment & Public Works Committee Chairman Robert T. Stafford (R-Vt.) wants to avoid the partisan bloodletting of past Air Act debates, and is on record as opposing significant changes—other than the addition of an acid rain reduction program.

Hoping to keep the Air Act debate simple, Sen. Stafford was urging Sen. George Mitchell (D-Maine), sponsor of the major acid rain bill, not to try to tack his bill on to the Air Act funding reauthorization. Sen. Stafford is a cosponsor of the Mitchell bill, however, and is expected to push for its passage once the Air Act amendments are out of the way.

As for Air Act amendments themselves, observers believe if the House, currently behind the Senate in committee action, can generate some motion, a bill will reach the President's desk by mid-year—just in time to avoid getting complicated by the 1982 congressional elections. The major question that remains is what shape such a bill will take.

Less PSD regulation. Perhaps the best chance the industry has of getting relief from Air Act regulations is in the PSD program, where the current breakdown of "clean air" areas into three classes—with specific and stringent emissions limits for each class—may be simplified in favor of one class covering national parks and similar areas and another requiring less stringent emission limits in other pristine federal lands. Under such a system, recommended by President Carter's National Commission on Air Quality, a number of paper mills would no longer be required to meet PSD emission limits; instead, they would be subject to best available control technology (BACT) or new source performance standards (NSPS), preferred by the industry.

Other possible changes include extensions of present 1987 deadlines for cities such as New York or Los Angeles that are a long way from attainment, and replacement of LAER with industry-supported BACT standards.

Acid rain bill. While the regulators are adapting to a new administration with an antiregulatory bias, Congress appears ready to hand EPA a new set of rules to enforce. Under the Mitchell bill, states would be required to take action to cut sulfur dioxide emissions by 10 million tpy in the East and Midwest by 1990, while also placing a cap on existing emissions of sulfur dioxide and nitrogen oxides. All "major stationary sources" that emit over 100 tpy of either pollutant in the 31 states in question would be subject to the cap.

Plants subject to the 10-million-tpy reduction effort would be all electric-generating power plants burning fossil fuel with more than 1% sulfur dioxide. Mitchell estimates his program would cost industry nearly $3 billion/year to implement the bill.

States that fail to issue plans to meet their quota of emissions reductions under the program would find the EPA regulating power plants in their territory. Under another bill, introduced by Sen. Christoper Dodd (D-Conn.) states could sue emitters in other states to gain relief from acid rain.

Computer modeling. That just about exhausts the list of changes expected by the paper industry out of this Congress. Despite widespread agreement that computer modeling to predict day-by-day emissions patterns simply doesn't work, Congress is unlikely to drop that requirement for PSD areas, Fielding believes. Another Washington observer added that current rules covering short-term—three-hour or 24-hour—emission overloads will not be knocked out either.

Another area where the industry has been unsuccessful in changing Congress' mind is in the near-duplication of requirements carried in the parallel NSPS and BACT standards. The paper industry wanted to get the law changed so NSPS and BACT would be equivalent—which they virtually are in practice, the industry maintains—but state governments told Congress that such rules are not equivalent in the case of all industries, and

that NSPS are not strong enough in many cases. Congress believed the states.

Perhaps the most important philosophical defeat for business in the current Air Act debate, however, came when industry proposed the introduction of cost-benefit analysis into rulemaking proceedings. Weyerhaeuser Co. senior vice president William Ruckleshaus indicated that was one change that could not be made by EPA, and would require congressional action. But opponents killed that drive by accusing proponents of "trading lives for dollars," one lobbyist noted, adding, "People up on the Hill just aren't willing to take the heat on that."

EPA regulatory agenda. Much industry attention is still focused on issues that EPA does have to resolve. Items still on the regulatory agenda include NSPS for industrial boilers, due out this spring at the earliest; and Administration review of the visibility protection program, and especially the Interior Dept.'s controversial plan to protect the "integral vistas" of 47 national parks and monuments, with the review expected to be in full swing by the beginning of 1982.

Clean Water Act debate. Debate in Congress over proposed amendments to the Clean Water Act will be far simpler, as far as the paper industry is concerned. The question of a likely postponement of the effective date for best conventional technology (BCT) requirements from the current statutory date of July 1, 1984, is one of the most important items on the industry's agenda. International Paper Co.'s Alan Lindsey noted that "with EPA not even having the numbers [effluent guidelines] out yet, it's getting to the point where it would be impossible to meet that date." Another observer said Congress may extend that deadline two or three years.

Most Water Act issues facing the industry are regulatory rather than legislative, although the overall Water Act amendment process, encompassing changes desired by many industries, could stretch out in Congress to the end of 1982. Probably the most important regulatory issue for the paper industry is the BCT numbers. A federal appellate court struck down previous guidelines in July, saving the pulp and paper industry as much as $1 billion, according to API estimates. New guidelines may be proposed by EPA as early as March 1982. NSPS guidelines for the industry are also expected in 1982.

General pretreatment guidelines are now scheduled to go into effect Jan. 31, 1982. The industry hopes to get rules changed in order to "avoid redundant treatment, to make sure that rules do not require industry to treat a waste, before it discharges into a municipal system, which the municipal system is capable of and would treat anyway," API's Mark Rey explained.

Hazardous wastes. Virtually all hazardous waste issues of concern to the paper industry are in the hands of EPA rather than Congress. Among those that may be decided this year are: definitions of hazardous wastes; whether or not EPA will suspend permitting standards for existing incinerators and surface impoundments—if standards are suspended, a regulatory impact analysis is not expected from EPA before April 1983, with a decision by the end of 1983; and whether or not EPA will develop a corrosivity test for solids, which could bring bleach plant wastes under solid waste regulation.

Also this year or in the first quarter of next year, EPA is expected to move to simplify notification standards for sudden releases of hazardous substances into the environment, while the Treasury Dept. is carrying out two studies, dealing with nonsudden releases of hazardous wastes and with the feasibility of creating a private insurance system to handle post-site-closure financial responsibility. One of the studies was due to be completed by December 1981, but results of both are expected around the end of 1982.

CAPITAL SPENDING

Survey lists 23 possible new mills, 48 new paper/board machines, 75 large expansions, and 46 U.S./Canadian companies that are spending over $100 million

By STEPHANIE POLLITZER, Consulting Editor

☐ U.S. and Canadian pulp and paper companies have announced plans to spend close to $16 billion over the next six-year 1981-86 period, according to data reported to P&P for its annual survey of capital spending projects. About 22% of this amount is designated for projects to be completed in 1984 or later. This is a higher percentage of farther-forward fiscal programming than has been reported in earlier P&P surveys. It can certainly be considered an earnest of faith in the future of North America's pulp and paper industry.

Recent economic constraints have resulted in the postponement (primarily by companies in the timber industry) of a number of expansion projects, but few projects have been cancelled outright. The tabulations in this summary do not include cost figures for these announced postponements.

In the U.S., anticipated spending of $10.328 billion is a very modest rise of 3% above that reported for the 1981 survey. Included in this figure are $7.528 billion for projects to be completed in 1981-83, and $2.8 billion for 1984-86.

Spending by U.S. mills in the year 1981, according to U.S. Dept. of Commerce figures, was expected to be $6.54 billion. P&P has estimated that 1982 spending will be $6.50 billion. Data compiled by McGraw-Hill Economics reports $6.61 billion to be spent in 1981, and $7.88 billion anticipated for 1982.

In Canada, pulp/paper industry spending plans reported in this P&P survey total C$5.566 billion, about 13% above last year's report. This includes about $814 million for projects to be completed in 1984 and later. Canadian industry spending in 1981, according to Statistics Canada, was expected to be $2.6 billion. P&P has estimated that 1982 spending will be $3.0 billion.

In view of the increased attention being paid to energy costs and operations, we are presenting this year a separate calculation of spending for power and energy-conservation projects. In the U.S., this amount ($1.8 billion) is about 17% of total expenditures; in Canada, (C$586 million) it is about 10%.

Environmental spending continues to be an important factor. In the U.S., environmental programs for the period are reported at $1.3 billion, 12% of total. In Canada, environmental programs are C$803 million, 14% of total.

Because some companies make no public announcements of capital expenditures, and other firms do not release financial information on announced programs, P&P's survey must be considered conservative. Cost data for proposed, not-yet-approved projects are not included in the tabulations.

Information in the annual capital spending survey is compiled from data reported directly to P&P from information that has been publicly released. Data do not normally include spending for woodlands nor for off-site converting facilities. (Copies of these listings are available, see page 112 for information.)

The tables and lists in this report are compiled from the individual mill programs for the three-year period 1981-83. In addition, information on programs for later completion (1984-86) is included; these data are noted in footnotes to the tables. Assignment of cost data to the various categories (for example, pulping, new machines,

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Photo above shows construction at International Paper Co.'s $575-million containerboard complex at Mansfield, La.

modifications, and water quality) is based on reports from the companies where available, or is made by P&P, and should be considered as approximations.

UNITED STATES

South to spend 60% of total; West drops to 11% (six-year low)

Total dollar value of spending plans for U.S. mills reported by P&P in this 1982 survey comes to $10.328 billion, a very modest 3% increase over the amount reported last year. Interestingly, more than one-fourth of reported spending is for projects to be completed in 1984 and later, with $7.53 billion for the near-term 1981-83 period.

The South continues its lead over other U.S. regions in expansion plans and accounts for 60% of the spending reported in this survey (up from last year's 55%). Mississippi once again exceeds $1 billion in spending programs. Other southern states reporting programs totaling more than $500 million are: Louisiana ($896 million); Georgia ($870 million); Alabama ($839 billion); South Carolina ($727 million); and Florida ($539 million).

Spending plans in the Midwest account for 19% of the total reported spending, as was true in the 1981 survey. Michigan leads in this region with $876 million; Wisconsin is in second place with $512 million.

The Mountain/Pacific states dropped from 16% to 11% of total spending reported, due primarily to completion of some large programs, as well as the long-run shift in new capacity growth to the South. Washington again leads other western states, reporting $775 million in programs.

The Northeast states continue to account for 10% of total U.S. spending. Maine is this region's leader, reporting $912 million, nearly 30% above the 1981 level.

The big spenders. Six companies report spending plans of more than $500 million. Leader in spending is Weyerhaeuser, with a total of $1.2 billion (two-thirds of this for the big Columbus, Miss., mill project). International Paper, in second place ($878 million), is also putting the bulk of its expenditures into a greenfield mill (Mansfield, La.). No. 3 spender, St. Regis Paper, is spreading its $821 million over a number of major projects, with two each at $296 million (Pensacola, Fla., and Sartell, Minn.).

Champion's spending plans of $802 million place it in No. 4 position; most of this for the new Quinnesec, Mich., mill ($483 million) and a major expansion at Courtland, Ala. ($184 million). Crown Zellerbach is No.

SEVEN-YEAR CAPITAL SPENDING TRENDS

UNITED STATES

P&P's reported three-year spending ($ billion)

Year	**Period**	**Production**	**Environment**		**Total**	**Annual capital expenditures**[1]
			Water	**Air**		
1982	1981-83	$6.216[2]	$0.635[3]	$0.677	$7.528[2]	$(6.50)[4]
1981	1980-82	7.783[2]	0.531	0.568	8.882[2]	6.54
1980	1979-81	8.003[2]	0.515	0.360	8.001[2]	6.80
1979	1978-80	4.911	0.350	0.251	5.759[5]	5.55
1978	1977-79	4.431	0.611	0.307	5.489[5]	4.41
1977	1976-78	3.455	0.783	0.433	5.001[5]	3.36
1976	1975-77	3.410	0.626	0.715	5.651[5]	3.27

1. Based on data from U.S. Commerce Dept; data for 1978, 1979 and 1980 have been revised.
2. 1982 data does not include $2.8 billion estimated for projects to be completed in 1984-86; 1981 data does not include $1.150 billion estimated to be spent in 1983-85; 1980 data does not include $0.877 billion estimated to be spent in 1982-85.
3. Includes $0.050 billion designated for 'Solid waste' control.
4. P&P estimate
5. Includes unallocated funds of $0.246 billion for 1979; $0.140 billion for 1978; $0.320 billion for 1977; $0.900 billion for 1976 surveys.

CANADA

P&P's reported three-year spending (C$ billion)

Year	**Period**	**Production**	**Environment**		**Total**	**Annual capital expenditures**[1]
			Water	**Air**		
1982	1981-83	C$3.949[2]	C$0.438[3]	C$0.365	C$4.752[2]	C$(3.00)[4]
1981	1980-82	3.645[2]	0.303	0.329	4.277[2]	2.606
1980	1979-81	2.440[2]	0.187	0.135	2.078[2]	1.954
1979	1978-80	1.462	0.110	0.113	1.685	1.426
1978	1977-79	1.442	0.166	0.112	1.720	1.143
1977	1976-78	2.169	0.189	0.157	2.518	1.171
1976	1975-77	2.062	0.228	0.135	2.425	1.058

1. Data from Statistics Canada; includes capital and repair expenditures for equipment and facilities.
2. 1982 data does not include C$0.814 billion estimated for projects to be completed in 1984-86; 1981 data does not include $0.643 billion estimated to be spent in 1983-85; 1980 data does not include $0.684 billion estimated to be spent in 1982-85.
3. Includes C$0.031 billion designated for 'Solid waste' control.
4. P&P estimate.

5, with $531 million in planned spending—the bulk for expansions at Camas, Wash. ($375 million) and Bogalusa, La. ($130 million).

New mills and machines. The list of new greenfield mills is enlarged by six announcements during 1981 for proposed mills: Champion, Halifax, N.C.; Georgia Kraft, Elberton, Ga., ISA International, Boligee, La.; Inland Container, Rancho Cucamonga, Calif.; Kimberly-Clark, southeast U.S.; and Union Camp, Eastover, S.C. Union Camp's project is the only one with a startup target. Removed from the list of proposed mills is the Toypack project, cancelled by the financial difficulties of its joint sponsor, Toyo Pulp Co. of Japan.

Three units were added to the list of new paper machines scheduled for installation at U.S. mills: Augusta Newsprint (Abitibi), Augusta, Ga.; Philip Morris/Wisconsin Tissue, Menasha, Wis.; and Scott Paper, Skowhegan, Maine.

Of the 30 machines reported, 14 are for printing/writing (6 for coated groundwood, 8 for free-sheet); 2 are for newsprint, 4 for tissue, 3 for kraft grades, 1 for specialty (security) papers, and 6 for linerboard and corrugating medium. Eleven machines that started operation in 1981 are included in the list.

Spending by categories. Programs in the "pulping/fiber" category (which include woodyard, chipping, and deinking facilities) total $2.9 billion, 28% of total U.S. spending. Of this, 66% is for mills in the South. In addition to major pulp capacity expansions at existing mills and construction of new mills, the pulp-category spending total includes a substantial portion for recovery boilers (new and modified).

Spending programs for new paper/board machines, at $1.2 billion, represent 11% of the total. The South will spend 62% of this amount.

TOP SPENDERS IN U.S.

Companies for which P&P reports capital
spending plans of $100,000,000 or more,
including production and environmental programs

	1981-83	1980-82
Weyerhaeuser	$1,243,100,000*	$1,214,100,000
International Paper	878,000,000	882,225,000
St. Regis Paper	820,638,000	703,432,000
Union Camp	803,900,000*	401,900,000
Champion International	800,974,000*	947,757,000
Crown Zellerbach.	530,900,000*	398,500,000
Mead Corp.	440,200,000	393,200,000
Leaf River Pulp Mill	400,000,000*	400,000,000
Scott Paper	395,500,000	141,400,000
MacMillan Bloedel	318,355,000	322,836,000
Hammermill Paper	274,346,000	140,994,000
Boise Cascade	270,000,000	474,000,000
Continental Forest Industries	262,000,000	212,800,000
Augusta Newsprint (Abitibi)	243,495,000	—
Procter & Gamble	200,000,000	200,000,000
~~Madison Paper~~ Industries	185,000,000	185,000,000
Potlatch Corp.	184,594,000	258,591,000
Great Northern Nekoosa	176,349,000*	187,360,000
Federal Paper Board	175,130,000	187,350,000
Midtec	144,240,000	236,951,000
Westvaco	140,000,000	125,000,000
ITT Rayonier	124,800,000	125,200,000
Longview Fibre	119,000,000	80,000,000
Container Corp.	115,000,000	126,300,000
Willamette Industries	113,000,000	75,700,000
Philip Morris Industrial	106,113,000	37,928,000

*Includes programs for 1984-86 completion.

Expenditures reported for upgrading and modernizing existing machines total $655 million. The Midwest mills will spend 37% of this sum, with 35% allocated for mills in the South.

A reflection of this early-1980s economic situation is increased attention to energy conservation. In view of this new emphasis, P&P added a new spending category for this 1982 survey: "energy/power." Counting up the programs for new boilers, conversions of old boilers to use less-expensive and woodwaste fuels, plus "normal" power and energy programs produced a total of $1.8 billion, 17% of total U.S. spending plans.

Expenditures listed under "plant/miscellaneous" cannot be compared to last year's data, since all energy-related figures are omitted in this 1982 report. What is included in the 1982 figure of $2.5 billion are areas such as finishing and shipping facilities, storage and office space, or anything reported as "miscellaneous" or "general improvements."

Spending programs for environmental projects, at $1.3 billion, are up 19% from the 1981 survey, probably

SUMMARY OF U.S. PROJECTS—REPORTED EXPENDITURES, 1981-83+[1]
BY STATES (000 dollars)

STATE	PRODUCTION	ENVIRONMENTAL	TOTAL
Alabama	$ 730,755	$108,170	$ 838,925
Alaska	4,300	—	4,300
Arizona	45,000	—	45,000
Arkansas	11,886	21,699	33,585
California	80,900	—	80,900
Connecticut	7,330	300	7,630
Florida	487,013	52,317	539,330
Georgia	766,977	103,400	870,377
Idaho	73,633	144	73,777
Illinois	7,520	—	7,520
Indiana	6,338	55	6,393
Kentucky	73,000	—	73,000
Louisiana	793,936	102,436	896,372
Maine	799,213	112,937	912,150
Massachusetts	18,121	—	18,121
Michigan	723,993	152,394	876,387
Minnesota	349,143	73,591	422,734
Mississippi	1,017,131	180,000	1,197,131
New Hampshire	325	5,050	5,375
New York	22,516	1,023	23,539
North Carolina	355,959	45,559	401,518
Ohio	175,700	20,359	196,059
Oklahoma	184,000	16,000	200,000
Oregon	99,057	21,830	120,887
Pennsylvania	40,302	4,950	45,252
South Carolina	636,500	90,000	726,500
Tennessee	6,000	785	6,785
Texas	107,436	17,920	125,356
Virginia	255,150	26,300	281,450
Washington	680,885	94,300	775,185
West Virginia	215	4,600	4,815
Wisconsin	455,792	56,147	511,939
Total	**$9,016,053[2]**	**$1,312,266**	**$10,328,319[2]**

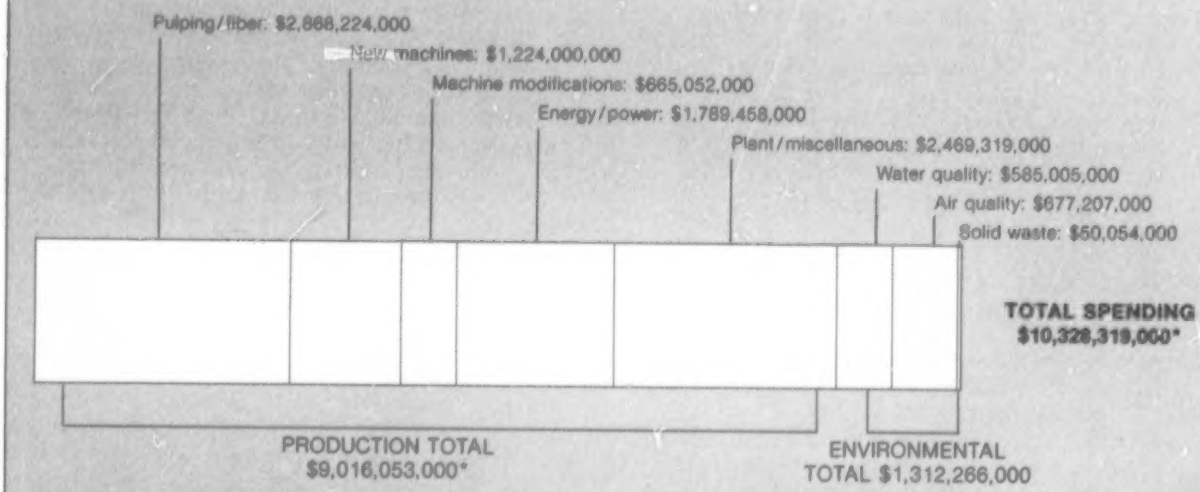
1. Includes projects, as announced, for 1984-86 period.
2. Dollar figure includes roughly $2.800.000.000 to be completed in 1984 and later. Over 80% of this is for four greenfield mills (Champion, Quinnesec; Leaf River, Hattiesburg; Union Camp, Eastover; Weyerhaeuser, Columbus). Approximately $500.000.000 is for modernization/expansion programs at existing mills.

due more to better assignment of costs than from a new round of environmental control programs. For the first time, P&P requested data on programs for solid waste control. These represent about 4% of the environmental total. Expenditures for water quality are 44% of the total, and for air quality 52%.

Spending according to region. The New England states report spending plans of $943 million, a 25% increase from the 1981 report. Almost all (96% of total spending) pulp/paper activity in New England is going on in Maine, with major programs underway by Great Northern, Madison,-St. Regis, and Scott.

No large programs are underway in the mid-Atlantic states, and spending plans for this region are a modest

UNITED STATES REPORTED SPENDING 1981-83+, BY TYPE OF FACILITY



*Total dollar figure includes estimated $2,800,000,000 for projects to be completed in 1984 and later. (Based on data reported to PULP & PAPER)

UNITED STATES—REPORTED CAPITAL EXPENDITURES FOR 1981-83+[1] BY REGIONS AND BY TYPE OF FACILITY (000 dollars)

PRODUCTION:	**PULPING/ FIBER**		**NEW MACHINES**		**MACHINE MODIFICATIONS**		**ENERGY/ POWER**		**PLANT/ MISCELLANEOUS**	
New England	$ 165,963	6%	$ 135,000	11%	$ 55,090	8%	$ 175,695	10%	$ 293,241	12%
Mid-Atlantic	27,380	1%	—	—	30,400	5%	—	—	5,038	0%
East North Central	313,994	11%	148,000	12%	242,460	36%	205,430	11%	459,486	19%
West North Central	159,000	6%	45,000	4%	5,000	1%	42,283	2%	97,860	4%
South Atlantic	841,464	29%	225,000	18%	101,755	15%	867,935	49%	465,660	19%
East South Central	724,881	25%	286,000	23%	29,205	4%	141,600	8%	645,200	26%
West South Central	342,050	12%	250,000	21%	104,381	16%	171,000	10%	229,827	9%
Mountain Pacific	293,492	10%	135,000	11%	96,761	15%	185,515	10%	273,007	11%
Total	**$2,868,224**	**100%**	**$1,224,000**	**100%**	**$ 665,052**	**100%**	**$1,789,458**	**100%**	**$2,469,319**	**100%**

ENVIRONMENT:	**WATER QUALITY**		**AIR QUALITY**		**SOLID WASTE**	
New England	$ 50,567	9%	$ 59,100	9%	$ 8,620	17%
Mid-Atlantic	4,600	1%	450	0%	923	2%
East North Central	119,366	20%	107,589	16%	2,000	4%
West North Central	35,860	6%	35,948	5%	1,783	4%
South Atlantic	109,750	19%	189,926	28%	22,500	45%
East South Central	136,095	23%	142,610	21%	10,250	20%
West South Central	73,677	13%	80,400	12%	3,978	8%
Mountain Pacific	55,090	9%	61,184	9%	—	—
Total	**$ 585,005**	**100%**	**$ 677,207**	**100%**	**$ 50,054**	**100%**

GRAND TOTAL PRODUCTION & ENVIRONMENT		
New England	$ 943,276	9%
Mid-Atlantic	68,791	1%
East North Central	1,598,325	15%
West North Central	422,734	4%
South Atlantic	2,823,990	27%
East South Central	2,115,841	21%
West South Central	1,255,313	12%
Mountain/Pacific	1,100,049	11%
	$10,328,319[2]	**100%**

1. Includes projects, as announced, for 1984-86 period.
2. Dollar figure includes an estimated $2,800,000,000 to be spent for projects to be completed in 1984 and later.

Regions are as follows:
New England: Me., Vt., N.H., Conn., R.I., Mass.
Mid-Atlantic: N.Y., N.J., Pa.
East North Central: Wis., Mich., Ill., Ind., Ohio
West North Central: N.D., S.D., Neb., Kans., Minn., Iowa, Mo.
South Atlantic: Del., Md., W. Va., Va., N.C., S.C., Ga., Fla
East South Central: Ky., Tenn., Miss., Ala
West South Central: Okla., Tex., Ark., La
Mountain/Pacific: Wash., Ore., Calif., Alaska, Ida., Nev., Mont., Wyo., Utah, Ariz., Colo., N.M.

$69 million.

East North Central states are spending $1.6 billion, up 10% over last year's survey. Most of this (87%) will be spent in Michigan and Wisconsin. Major projects in Michigan are those of Champion (Quinnesec) and Mead (Escanaba). Spending in Wisconsin is led by expansions at Midtec, Pentair, and Philip Morris (Wisconsin Tissue).

Data for West North Central states was received only from Minnesota—$423 million, 4% of national total.

South Atlantic states are spending $2.8 billion, nearly 60% above the 1981 figure. Much of this increase can be attributed to 1981 announcements by Union Camp for a new mill at Eastover, S.C., and by Augusta Newsprint (Abitibi) for a major expansion at Augusta, Ga. Other over-$100-million projects in these states are those of St. Regis at Pensacola, Fla.; Union Camp at Savannah, Ga.; Procter & Gamble at Oglethorpe, Ga; and Federal Paper at Riegelwood, N.C.

East South Central states' spending plans total $2.1 billion; though 16% below last year's report, they represent a number of large investments. Mississippi claims

NEW 'GREENFIELD' MILLS IN U.S., BUILT AND/OR PROPOSED

Champion International, Quinnesec, Mich. 265,000-tpy bleached hardwood kraft pulp mill	**1985**
Champion International, Halifax, N.C. Proposed pulp/white paper complex	**Late 1980s**
Champion International, Kirbyville, Texas Proposed 350,000-tpy unbleached pulp/linerboard mill	**No date**
Georgia Kraft, Elberton, Ga. Site purchased for 455,000-tpy linerboard mill	**No date**
ISA International, Boligee, La. Proposed 210,000-tpy newsprint mill	**No date**
Inland Container, Rancho Cucamonga, Calif. Feasibility study for possible recycled linerboard mill	**No date**
International Paper Co., Mansfield, La. 460,000-tpy linerboard, 270,000-tpy corrugating medium*	**1981**
Kimberly-Clark, Southeast U.S. Possible new pulp mill to supply fiber for disposable diapers	**No date**
Leaf River Pulp Mill, Hattiesburg, Miss. Proposed 315,000-tpy bleached kraft pulp mill	**1984**
Lextar, Deer Park, Texas 27,500-tpy polyolefin pulp plant	**1981**
North Mississippi Paper Mill, Batesville, Miss. Proposed 200,000-tpy newsprint mill	**No date**
Portals Inc., Hawkinsville, Ga. 1800-tpy security papers mill*	**1982**
Procter & Gamble, Oglethorpe, Ga. 300,000-tpy bleached kraft pulp mill	**1981**
Tenma Paper Mills & Co., Brunswick, Ga. Proposed 70-80,000-tpy clay-coated SBS foodboard mill	**No date**
Union Camp, Eastover, S.C. 210,000-tpy uncoated free-sheet white paper mil*	**1984**
Weyerhaeuser, Columbus, Miss. Three-machine pulp/paper complex; first phase for 175,000-tpy coated groundwood papers*	**1982-85**

*Machine is also listed under "New Machines"

NEW PAPER MACHINES IN U.S.

Augusta Newsprint (Abitibi), Augusta, Ga. 226,000-tpy, 346-in.-trim Valmet—newsprint	**1983**
Blandin Paper, Grand Rapids, Minn. Possible new groundwood specialty machine	**No date**
Boise Cascade, Rumford, Maine 158,000-tpy, 316-in.-wire, 3500-fpm Valmet—ctd. groundwood	**1981**
Champion International, Courtland, Ala. 145,000-tpy machine—uncoated free sheet	**1983**
Crown Zellerbach, Camas, Wash. 160,000-tpy machine—uncoated free sheet	**1984**
Fort Howard Paper Co., Muskogee, Okla. 96,000-tpy machine—tissue/napkin	**1981**
Georgia-Pacific, Crossett, Ark. or Palatka, Fla. 300,000-tpy, 349-in.-trim machine—sack kraft/linerboard	**1983+**
Georgia-Pacific, Palatka, Fla. 60,000-tpy, 211-in.-trim Beloit—tissue	**1981**
Georgia-Pacific, Port Hudson, La. 138,000-tpy machine—white bond/offset	**1982+**
International Paper, Mansfield, La. Two 348-in.-trim, 2500-fpm Tampella fourdriniers—460,000-tpy linerboard, and 270,000-tpy corrugating medium	**1981**
Longview Fibre, Longview, Wash. No. 12 machine—lightweight kraft	**No date**
MacMillan Bloedel, Pine Hill, Ala. 210,000-tpy, 284-in.-wire, 2500-fpm Tampella—corr. medium	**1983**
Madison Paper Industries, Madison, Maine 165,000-tpy, 282-in.-trim Valmet fourdrinier—sc groundwood	**1981**
Mead Corp., Escanaba, Mich. 200,000-tpy, 330-in.-trim, 3000-fpm Valmet—ctd. groundwood	**1982**
Mead Corp., Chillicothe, Ohio 179,000-tpy, 300-in.-trim, 3000-fpm Valmet—free-sheet	**1981**
Philip Morris/Wisconsin, Menasha, Wis. 60,000-tpy, 208-in.-trim Beloit—tissue	**1983**
Portals Inc., Hawkinsville, Ga. 1800-tpy security papers machine	**1982**
St. Regis Paper Co., Pensacola, Fla. 236,000-tpy, 370-in.-wire, 2600-fpm Beloit—kraft paper	**1983**
St. Regis Paper Co., Sartell, Minn. 170,400-tpy machine—lightweight coated groundwood	**1982**
Scott Paper, Skowhegan, Maine 200,000-tpy, 290-in.-trim, 3000-fpm machine—coated free-sheet	**1983**
Scott Paper, Everett, Wash. 53,000-tpy 'advanced technology' machine—tissue	**1981**
Stone Container/S.C. Industries, Florence, S.C. 105,000-tpy, 172-in.-trim, 2500-fpm Carcano—linerboard	**1981**
Union Camp, Eastover, S.C. 600-tpd machine—uncoated free-sheet	**1984**
Westvaco, Wickliffe, Ky., or Luke, Md. 150,000-tpy machine—coated free-sheet	**No date**
Weyerhaeuser, Columbus, Miss. 175,000-tpy machine—lightweight coated groundwood Uncoated free-sheet machine; second LWC unit (1983-85)	**1982**
Weyerhaeuser, Valliant, Okla. 194,000-tpy, 280-in.-trim, KMW-Johnson—linerboard	**1982**
Weyerhaeuser/Norpac, Longview, Wash. 210,000-tpy, 352-in.-trim, 4000-fpm Beloit—newsprint	**1981**
Willamette, Hawesville, Ky. 100,000-tpy, 270-in.-trim Valmet twin-wire—uncoated free-sheet	**1981**

the giant Weyerhaeuser complex at Columbus and the Leaf River pulp mill at Hattiesburg (together over $1.3 billion). In Alabama, major expansions are underway at Champion, Courtland; Hammermill, Selma; and MacMillan Bloedel, Pine Hill.

Spending plans in West South Central states are $1.255 billion, a drop of 7% from a year ago. Largest investment here is IP's greenfield mill at Mansfield, La. Other major expansion programs are Crown Zellerbach at Bogalusa, La.; Weyerhaeuser at Valliant, Okla.; and St. Regis at Houston, Texas.

Total spending in the Mountain/Pacific states, at $1.1 billion, is 30% below year-ago data. A number of major expansions have been completed, and only one program now underway (Crown Zellerbach at Camas, Wash.) exceeds $100 million.

The data in P&P's survey cannot be considered official, but it appears to indicate that the industry is in a temporary holding pattern—a wave of large capital investment programs came on-stream in 1980 and 1981, and another wave of large programs is in the wings (scheduled for 1984-86). In the U.S. in 1982-83, only one large greenfield mill is scheduled to start (Weyerhaeuser, Columbus, Miss.), but 12 to 15 paper machines should come into operation.

MAJOR MODERNIZATION/ EXPANSION PROJECTS IN U.S.
(over $45,000,000 at an existing mill site)

Alton Packaging, Jacksonville, Fla.	$ 54,000,000
Augusta Newsprint (Abitibi), Augusta, Ga.	243,495,000*
Boise Cascade, Rumford, Maine	265,000,000*
Bowater Inc., Catawba, S.C.	63,500,000
Champion International, Courtland, Ala.	183,85[illegible],000*†
Champion International, Canton, N.C.	62,959,[illegible]
Chesapeake, West Point, Va.	89,700,[illegible] †
Container Corp., Fernandina Beach, Fla	75,000,[illegible]
Continental Forest Industries, Hodge, La.	64,000,000
Continental Forest Industries, Hopewell, Va.	147,000,000
Crown Zellerbach, Bogalusa, La.	130,000,000
Crown Zellerbach, Camas, Wash.	375,000,000*†
Federal Paper Board, Riegelwood, N.C.	141,100,000
Fort Howard, Muskogee, Okla.	75,000,000*
Georgia-Pacific, Palatka, Fla.	45,000,000*
Great Northern Nekoosa, Millinocket, Maine	47,498,000 †
Hammermill, Selma, Ala.	202,000,000
ITT Rayonier, Jesup, Ga.	118,800,000
International Paper, Bastrop, La.	64,000,000
Longview Fibre, Longview, Wash.	115,000,000
MacMillan Bloedel, Pine Hill, Ala.	295,405,000*
Madison Paper Industries, Madison, Maine	185,000,000*
Mead Corp., Escanaba, Mich.	285,000,000*
Mead Corp., Chillicothe, Ohio	126,000,000*
Midtec, Kimberly, Wis.	133,650,000
Pentair/Niagara, Niagara, Wis.	46,500,000 †
Pentair/Flambeau, Park Falls, Wis.	46,400,000 †
Philip Morris/Wisconsin, Menasha, Wis.	78,113,000*
Potlatch/Pulp & Paperboard, Lewiston, Idaho	72,839,000
Potlatch/Northwest, Cloquet, Minn.	108,113,000
St. Joe Paper, Port St. Joe, Fla.	63,000,000 †
St. Regis Paper, Pensacola, Fla.	295,999,000
St. Regis Paper, Bucksport, Maine	86,701,000
St. Regis Paper, Sartell, Minn.	295,713,000*
St. Regis Paper, Houston, Texas	83,537,000
Scott Paper, Skowhegan, Maine	195,000,000*
Scott/Warren, Westbrook, Maine	65,000,000
Southwest Forest Industries, Snowflake, Ariz.	45,000,000
Stone Container/S.C. Industries, Florence, S.C.	55,000,000*
Union Camp, Savannah, Ga.	165,700,000
Weyerhaeuser, Valliant, Okla.	115,000,000*
Weyerhaeuser/Norpac, Longview, Wash.	164,000,000*
Willamette, Hawesville, Ky.	73,000,000*

*Includes new paper machine shown in listing on preceding page
†Includes programs for 1984-86 completion

Dollar figures are not available for some expansion programs that include new paper machines: Georgia-Pacific, Crossett, Ark., and Port Hudson, La.; Westvaco, Luke, Md., or Wickliffe, Ky.

CANADA

Plans include 16 new machines, government-supported expansions

Spending plans for Canadian pulp and paper companies reported by P&P in its 1981-83 survey total C$5.66 billion, a rise of 13% over last year's report. Some $800 million of this is for projects to be completed in 1984-86.

British Columbia continued to maintain its No. 1 position as the Canadian province with the largest spending programs. But its $1.7-billion total this year (down 9% from 1981's figure) is only 30% of the national total, compared with 42% in 1981 and 47% in 1980. Ontario, in No. 2 spot with $1.57 billion, represents 28% of the total; Quebec's $1.2 billion is 21%; New Brunswick, at $628 million is 11%. These four provinces account for 90% of Canada's spending plans.

Mills in eastern Canada (in Ontario, Quebec, New Brunswick, and Nova Scotia) benefit from financial grants from provincial and federal governments, as part of Canada's program to help improve the competitive position of the pulp/paper industry. The Western provinces do not participate in the program since they generally (British Columbia in particular) have modern facilities.

Company spending plans. Abitibi-Price, which is undertaking major expansions at a number of mills, takes

SUMMARY OF CANADIAN PROJECTS—
REPORTED EXPENDITURES 1981-83[1]
BY PROVINCES (000 Canadian dollars)

PROVINCE	PRODUCTION	ENVIRONMENTAL	TOTAL
Alberta	$ 154,440	$ 24,000	**$ 178,440**
British Columbia	1,435,054	265,527	**1,700,581**
Manitoba	6,850	27	**6,877**
New Brunswick	557,368	70,304	**627,672**
Newfoundland	165,050	20,000	**185,050**
Nova Scotia	78,644	7,050	**85,694**
Ontario	1,398,781	170,776	**1,569,557**
Quebec	938,513	245,553	**1,184,066**
Saskatchewan	28,350	—	**28,350**
Total	**$4,763,050[2]**	**$803,237**	**$5,566,287[2]**

1. Includes projects, as announced, for 1984-86 period.
2. Dollar figure includes $814,000,000 for projects to be completed in 1984 and later. Included are the BCFP greenfield mill in Alta., and major expansion programs (over $75,000,000) at Boise, Kenora; Con-Bath, Ville de La Baie; and Fraser, Atholville.

No. 1 spot in company capital-spending plans with $483 million. Four other firms report planned expenditures in excess of $300 million: B.C. Forest Products, Consolidated-Bathurst, Great Lakes, and Northwood Pulp. Altogether, 20 Canadian companies report spending plans for at least $100 million, compared to 16 companies in the 1981 survey; 11 of these include projects for 1984-86 completion.

(Continued)

CANADA—REPORTED CAPITAL EXPENDITURES FOR 1981-83+[1] BY REGIONS AND BY TYPE OF FACILITY (000 Canadian dollars)

PRODUCTION:	**PULPING/ FIBER**		**NEW MACHINES**		**MACHINE MODIFICATIONS**		**ENERGY/ POWER**		**PLANT/ MISCELLANEOUS**	
Maritimes	$ 350,454	18%	$ 37,000	6%	$ 74,631	17%	$ 205,659	35%	$ 133,318	11%
Quebec	361,834	18%	96,300	17%	227,880	52%	94,242	16%	158,257	13%
Ontario	512,415	26%	210,000	37%	98,022	22%	166,648	29%	411,696	35%
Central	26,190	1%	—	—	4,400	1%	—	—	4,610	1%
West	748,414	37%	225,000	40%	33,223	8%	119,248	20%	463,609	40%
Total	**$1,999,307**	**100%**	**$568,300**	**100%**	**$438,156**	**100%**	**$ 585,797**	**100%**	**$1,171,490**	**100%**

ENVIRONMENT:	**WATER QUALITY**		**AIR QUALITY**		**SOLID WASTE**		**GRAND TOTAL PRODUCTION & ENVIRONMENT**		
Maritimes	$ 43,723	11%	$ 53,504	15%	$ 127	0.4%	Maritimes	$ 898,416	16%
Quebec	132,400	32%	82,138	23%	31,015	99.6%	Quebec	1,184,066	21%
Ontario	92,575	23%	78,021	21%	—	—	Ontario	1,569,557	28%
Central	27	0%	—	—	—	—	Central	35,227	1%
West	138,500	34%	151,027	41%	—	—	West	1,879,021	34%
Total	**$ 407,225**	**100%**	**$364,870**	**100%**	**$ 31,142**	**100%**		**$5,566,287**[2]	**100%**

1. Includes projects, as announced, for 1984-86 period.
2. Dollar figure includes estimated C$814,000,000 for projects to be completed in 1984-86 period.

Note: Tabulations are based on these regional divisions: "Maritimes" is New Brunswick, Newfoundland, and Nova Scotia; "Central" is Manitoba and Saskatchewan; "West" is British Columbia and Alberta; Ontario and Quebec are treated individually.

TOP SPENDERS IN CANADA

Companies for which P&P reports capital spending plans of $100,000,000 or more, including production and environmental programs (Canadian dollars)

	1981-83	**1980-82**
Abitibi-Price	$483,245,000*	$302,045,000
B.C. Forest Products	383,323,000*	383,731,000
Consolidated-Bathurst	371,569,000*	317,710,000
Great Lakes Forest Products	340,000,000	430,000,000
Northwood Pulp & Timber	310,000,000	150,000,000
E.B. Eddy Forest Products	309,164,000*	290,117,000
Ontario Paper	277,597,000*	267,037,000
Western Forest Products	272,000,000	250,000,000
CIP Inc.	252,600,000*	205,500,000
MacMillan Bloedel	245,116,000	136,200,000
Fraser Inc.	228,500,000	10,387,000
Boise Cascade Canada	220,000,000*	35,000,000
Domtar Inc.	203,925,000*	195,993,000
Reed Paper	198,800,000*	—
Crown Zellerbach Canada	186,300,000	186,300,000
Donohue Normick	165,000,000	165,000,000
Scott Paper	150,000,000*	—
Kimberly-Clark of Canada	142,928,000*	136,200,000
Canadian Forest Prod.	127,055,000	34,553,000
Eurocan Pulp & Paper	100,000,000	240,000

*Includes programs for 1984-86 completion.

MAJOR MODERNIZATION/ EXPANSION PROJECTS IN CANADA

(over $35,000,000 at an existing mill site)

Abitibi-Price, Grand Falls, Nfld.	$ 54,600,000*
Abitibi-Price, Stephenville, Nfld.	130,4500,000
Abitibi-Price, Iroquois Falls, Ont.	117,100,000
Acadia Forest Prods., Nelson-Miramichi, N.B.	47,999,000
American Can of Canada, Marathon, Ont.	72,205,000*
BC Timber, Prince Rupert, B.C.	47,045,000
Boise Cascade Canada, Nelson-Miramichi, N.B.	35,000,000
Boise Cascade Canada, Fort Frances, Ont.	35,000,000*
Boise Cascade Canada, Kenora, Ont.	150,000,000*
B.C. Forest Products, Crofton, B.C.	161,973,000
CIP Inc., Dalhousie, N.B.	144,500,000
CIP Inc., Toronto, Ont.	36,000,000
Canadian Forest Products, Port Mellon, B.C.	106,528,000
Consolidated-Bathurst, Bathurst, N.B.	98,000,000
Consolidated-Bathurst, Shawinigan, Que.	43,290,000
Consolidated-Bathurst, Trois Rivières, Que.	75,273,000*
Consolidated-Bathurst, Ville de La Baie, Que.	99,234,000*
Crown Zellerbach Canada, Campbell River, B.C.	176,100,000
Domtar, Cornwall, Ont.	51,800,000*
Domtar, Donnacona, Que.	54,150,000*
Donohue, Clermont, Que.	46,835,000
E.B. Eddy Forest Products, Espanola, Ont.	284,023,000*
Eurocan, Kitimat, B.C.	100,000,000
Fraser, Atholville, N.B.	170,430,000
Fraser, Edmundston, N.B.	58,150,000
Great Lakes Forest Products, Dryden, Ont.	340,000,000
Kimberly-Clark/Spruce Falls, Kapuskasing, Ont.	88,200,000
MacMillan Bloedel, Powell River, B.C.	166,000,000
Northwood Pulp & Timber, Prince George, B.C.	310,000,000
Nova Scotia Forest Ind., Point Tupper, N.S.	53,260,000
Ontario Paper, Thorold, Ont.	265,277,000*
P&W/St. Anne Nackawic, Nackawic, N.B.	60,000,000*
Reed Paper, Quebec City, Que.	159,800,000*
Scott Paper, New Westminster, B.C.	63,000,000*
Tembec Forest Products, Temiscaming, Que.	43,060,000
Western Forest Products, Port Alice, B.C.	47,000,000
Western Forest Products, Squamish, B.C.	205,000,000

*Includes programs for 1984-86 completion

Spending plans for expansions and modernization at existing mill sites reflect, in Canada as in the U.S., the economics of incremental capacity expansions vs new mill construction. Expansion/modernization expenditures of $35 million and over are shown for 37 Canadian mill sites; 13 of these include new paper machines. Five of the programs are priced at over $200 million: E.B. Eddy, Espanola, Ont; Great Lakes, Dryden, Ont.; Northwood Pulp, Prince George, B.C.; Ontario Paper, Thorold, Ont; and Western Forest Products, Squamish, B.C.

NEW 'GREENFIELD' MILLS IN CANADA, BUILT AND/OR PROPOSED

B.C. Forest Products, Hurdy, Alta. 160,000-m-tpy newsprint mill*	1985
Doman Industries, Duke Point, B.C. Proposed 175,000-m-tpy TMP mill	No date
Donohue Normick, Amos, Que. 159,000-tpy newsprint mill*	1982
Makin Project Ltd., Red Deer, Alta. Proposed 175,000-m-tpy CMP pulp/paper mill	No date
Quebec Public Works Ministry, Maniwaki, Que. Proposed 300-400-m-tpd medium-density fiberboard mill	1984
Quesnel River Pulp, Quesnel, B.C. 159,000-m-tpy TMP mill	1981
Rexfor/Soucy, Matane, Que. Proposed 175,000-m-tpy TMP/newsprint mill	No date

*Machine is also listed under "New Machines"

NEW PAPER MACHINES IN CANADA

Abitibi-Price, Grand Falls, Nfld. Newsprint machine	1984
Abitibi-Price, Iroquois Falls, Ont. 190,000-m-tpy, 348-in.-trim, 3200-fpm Valmet—newsprint	1982
B.C. Forest Products, Hurdy, Alta. 160,000-m-tpy machine—newsprint	1985
B.C. Forest Products, Crofton, B.C. 175,000-m-tpy Beloit twin-wire—newsprint	1982
CIP Inc., Toronto, Ont. 27,000-m-tpy, 176-in.-trim, 6000-fpm KMW twin-wire—tissue	1981
Consolidated-Bathurst, Bathurst, N.B. Replacement of existing machine—corrugating medium	1986
Consolidated-Bathurst, Trois Rivières, Que. 70,000-m-tpy Black Clawson-Kennedy—groundwood spec.	1982
Crown Zellerbach Canada, Campbell River, B.C. 175,000-m-tpy, 360-in.-wire, 4000-fpm Valmet—newsprint	1982
Donohue-Normick, Amos, Que. 159,000-m-tpy, 300-in.-trim, 3500-fpm Dominion—newsprint	1982
Great Lakes Forest Products, Dryden, Ont. Possible 175,000-m-tpy machine—newsprint	No date
Kruger Inc., Trois Rivières, Que. 172,000-m-tpy machine (from storage)—newsprint	1982
Maclaren, Masson Que. Proposed 195,000-m-tpy machine—newsprint	1983
MacMillan Bloedel, New Westminster, B.C. 75,000-m-tpy, 179-in.-wire, 3000-fpm Valmet—uncoated free sheet (postponed)	No date
MacMillan Bloedel, Powell River, B.C. 160,000-m-tpy, 330-in.-trim, 3500-fpm Beloit—newsprint	1981
Ontario Paper, Thorold, Ont. Two 300-in.-trim Beloit (310,000-m-tpy total)—newsprint	1982
Scott Paper, New Westminster, B.C. 36,000-m-tpy, 185-in.-trim, 5000-fpm KMW—tissue	1984

New mills and new machines. No new greenfield mills were announced in Canada in 1981. One mill was started in late 1981 (Quesnel River Pulp in B.C.) and another is targeted for 1982 operation (Donohue Normick in Que.).

The number of new paper machines listed for Canada in this survey has increased to 16. Of these, 12 are for newsprint, including seven machines designed for 1982 startup (some of these replace existing units). Other new machines in Canada are two units designed for tissue, and one each for groundwood specialties, uncoated free-sheet, and corrugating medium.

Spending by categories. Expenditures for "pulping/fiber" (which include woodyward and chipping facilities) continue to lead all other categories for Canada in P&P's survey. The $2 billion reported in 1982 for pulping expenditures represents 35% of the total. Spending for new machines ($568 million) is 10% and for machine modifications ($438 million) is 8% of Canada's total. New this year is a separate division for "energy/power" expenditures, and Canadian mills report $586 million for this category, 10% of total. This is a lower percentage than reported by U.S. mills, and reflects the lower cost of energy for Canadian mills.

Spending for production-related programs in Canada in this 1982 survey is 86% of total, with 14% allocated for environmental programs. Environmental spending was 13% of the 1981 survey total; 12% in 1980. ☐

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MANAGEMENT

Battle lines shaping up in coming war between paper, electronic media

Printing and writing mill executives are beginning to get a fix on the threat to uncoated free sheet, newsprint, as well as uncoated groundwood paper

By DAVID R. ALLAN, News Editor

☐ Every printing and writing paper mill in North America will feel the chilly breath of the electronic media on its neck by the end of this century. Computer terminals in the office and home, tied in to central computers that can provide information and store, as well as transmit messages, could make some uses for paper nearly obsolete within the next 20 to 30 years.

For some companies, that will mean an eventual, permanent end to healthy sales-growth rates. For others, it may present opportunities to capture market share in areas of the paper industry that stand to substantially benefit from the electronic revolution in communications.

Finding the best course to follow in the coming years, in order to meet the challenge of the electronic media, has already become nearly a full-time job for some paper industry planning and marketing executives. One consulting company estimated that the number of seminars held on the "electronic office" in the U.S. has risen from about 20 in 1978 to an estimated 200 this year. And still no credible projections have been developed that can trace which grades of paper will be hurt by electronic competition, which will be helped, and by how much.

However, some paper company executives have begun to have some pretty solid theories on where the biggest danger areas lie and where the greatest potential opportunities may be found.

Newsprint

The paper grade who's vulnerability has gotten the most public scrutiny in the last few years is newsprint. Newsprint may bear the brunt of experimentation with consumer information distribution systems, with newspaper chains such as Knight-Ridder, broadcast networks such as CBS, and even American Telephone & Telegraph testing ways to deliver news and information in alpha numeric form to home screens. One executive cited a recent American Paper Institute study that counted 83 home video information systems in operation around the

Table 1. **Major grades of paper that may be affected by electronic competition: U.S. production**
(000 short tons)

	1970	1975	1980	1985e
Newsprint[1]	12,200	11,400	14,400	16,500
Groundwood specialties				
Roto news[2]	270	225	250	315
Directory[3]	200	300	450	575
Catalog[3]	250	300	390	450
Groundwood forms	n.a.	75	230	360
Book paper	155	130	130	130
Uncoated free sheet				
Forms bond	720	950	1500	1900
Envelope stock	190	160	225	250
Offset book	1400	1450	2000	2400
Bond and writing	700	1000	1800	2300
Tablet	350	230	325	300
Coated paper				
Nos. 1 to 4, two-side	950	1200	1800	2200
No. 5, two-side	1950	1650	2400	3100

n.a. = not applicable

[1] North American production

[2] Estimated U.S. consumption: 1980—700,000 tons; 1985—900,000 tons. Estimates for 1970 and 1975 not considered reliable.

[3] Numbers reflect estimated U.S. consumption, not production. Estimates for production not considered reliable.

Source: PULP & PAPER estimates.

◀**Computer control room** coordinates Mead Corp.'s Lexis and Nexis electronic data services.

world, ranging from Britain's one-way (noninteractive) Ceefax system, with an estimated 105,000 subscribers, to others, in some cases with 100 or fewer subscribers.

Some analysts, among them the Norwalk, Conn.-based consulting firm International Resources Development, believe newsprint consumption in the U.S. will begin to level out in the late 1980s, while one newsprint executive cited another consultant's study that showed newsprint demand levelling about 1990 and starting to fall around 1995. This executive said he doubts it will do more than level off in this century if AT&T's role in developing home video information services is severely limited by law—and will still take five to eight years to level off even if AT&T doesn't suffer from major legal limits—a sentiment often expressed by industry officials.

Book-size screens

A major problem for home news services is many consumers' reluctance to spend great lengths of time reading a bright, nonportable screen. But recent press accounts indicate Britain's Sinclair Research, along with Japan's Hitachi, Matsushita, and Toshiba, have all developed book-sized televisions with liquid crystal screens, solving portability and brightness problems—and for prices reportedly below $200/set.

But other problems may prove more difficult for the home news services to overcome. Mead Data Central's Bob O'Hara, himself a marketer of electronic information services, noted that among the decisions to be made by those trying to sell electronic information to the home, is the basic one of the delivery mechanism—"is it going to be roof antennas that will sell for $300 or $400? Is it going to be cable television? Is it going to be AT&T replacing twisted copper with fiber optics?"

Until some standardization appears in delivery mechanism—with decisions to be made requiring millions of dollars, or more, in capital investment—many believe home services will remain experimental. And the U.S. still has not adopted a technical standard for one-way or "teletext" broadcasts, also a requirement before teletext can benefit from economies of scale.

Legal obstacles

Another possible obstacle is the persistent resistence of newspaper publishers to AT&T attempts to bring "electronic Yellow Pages" services into the home. Legislation is now being considered that would restrict the phone company's role to offer any directory information electronically to that of a common carrier, rather than a generator of videotext (two-way or "interactive") information, suggesting that AT&T may ultimately opt for joint ventures, with local newspapers providing classified advertising and AT&T providing business directory information with no advertising content.

The degree of electronic delivery systems' penetration into classified advertising will determine whether or not the new media flatten newsprint demand, for a big loss of classified advertising could be the difference between growth and a static condition for many newspapers.

But no matter what form—if any—taken by electronic Yellow Pages or classifieds, it remains to be seen if consumers will pay to get more prompt and varied information services than they now enjoy. "Living at home in Connecticut, do I need to get the Brussels-to-Paris train schedule on my television screen? And if I need to know the time of the next train to Grand Central, I'll call Conrail; I don't need to pay to get it on my screen," one skeptical paper industry marketing man said.

Slower ad-growth rate

AT&T itself is thought to believe 7% of all U.S. homes will have videotext by 1990, while San Jose, Calif.-based Strategic Inc. predicts videotext penetration will be more than six times as great as the AT&T forecast, one executive noted.

Even more modest predictions indicate a possible slowing of newspaper advertising growth rates by 1990, however. At least one expert, McCann-Erickson Canada's Robert Troutbeck, believes that home videotext systems will carry about 3% of all Canada's advertising—in terms of revenue—by 1990, with terminals in 2% to 3% of Canadian homes. Classified advertising and direct mail will be the major categories, he estimates, with some impact on catalogues and point-of-sale advertising. If that estimate applies to the U.S. also, newsprint executives contemplating capacity changes in the 1990s—if not before—will have to consider whether they should be adding to capacity, or just replacing existing machines.

Uncoated groundwood

Still, in the home, uncoated groundwood may be affected as much as newsprint. Once again, AT&T's plans for electronic directories would affect uncoated groundwood mills, depriving the market of its biggest customer and one that, by itself, consumes about 80% of all North American directory paper production.

If other phone companies were to follow the lead of Ma Bell—and if the Official Airline Guide and other directories that are looking at electronic presentations do the same—then directory paper would virtually disappear from the North American market. And as Fraser Paper's Dan Temple noted, "AT&T is the one company that has the financial muscle to make the kind of investment that is necessary to provide full videotext capabilities."

Mills that want to export their directory paper would have a hard time finding markets, since the French government is proceeding with plans to replace all phone books with electronic directory hookups by 1995. Even if that timetable is replaced by a more reasonable one that would give the French a few more years to accomplish the gargantuan task, their experiment can be expected to be imitated by other European countries as well, rendering surplus most of Europe's directory paper capacity. Thus Europe wouldn't be a potential market for North American mills, and European mills would be competing hard for the world's remaining directory markets.

Videodisk catalogues

Catalogue paper may also be hurt by the electronic revolution. Sears Roebuck is already experimenting with video catalogues in its stores, and observers see no reason why all catalogue stores couldn't one day replace paper with video display terminals. And once a large number of American homes have terminals, catalogues could be electronically routed to videotext subscribers. Videodisk players could also replace paper catalogues if they ever reach wide penetration of the home market, since they offer the capability to freeze frames and move around the disk's memory at will.

All this comes at a time when old newsprint machines are slowly being converted to uncoated groundwood production (one U.S. newsprint executive predicted 1 million tpy of Eastern Canadian capacity would make that shift within five years) and new groundwood machines are being proposed. Among them is a 210,000 tpy machine being considered by ISA International, a subsidiary of Germany's Haindl Group, for a proposed mill in Alabama.

But the news for groundwood mills may not all be bad. Abitibi-Price and others are working hard to develop groundwood sheets that will run well through fast nonimpact printers, and consider such a product to be essential to their involvement in the growing groundwood computer paper market. In a day when small office computers are becoming cheaper and their printers faster, groundwood computer paper may prove to be the most durable segment of the groundwood market.

Coated paper

Coated paper is another grade that may be affected by the electronic revolution and also finds its way most commonly into the home. One estimate has the coated groundwood demand growth rate halving in ten years, from 4%/year in the 1980s to 2%/year in the 1990s, partly as a result of tonnage being preempted by feature articles and advertising going over to home news services. Serious impact on magazine readership probably depends on widespread use of videodisks or development of a portable flat display screen with less brightness than the typical VDT. Mill executives also comment that the penetration of videotext into the home environment may hurt use of coated free sheet for direct mail, which has served as a strength of the coated paper market in recent years.

Uncoated free sheet

The other big grade that could be affected is the family of uncoated free sheet. Major categories of uncoated free sheet that may be affected by new electronic information transmission markets and developments in data base management include offset, bond, tablet, xerographic, forms bond, and even envelope stock. Indeed, uncoated free sheet represents the front line in the battle between the paper industry and the much-ballyhooed—and overblown—"paperless office."

One estimate sees the number of high-speed intelligent printers installed in the U.S. shooting up by 266% between 1980 and 1985, to nearly 6800 units. These and many of the smaller, cheaper office computer/printer sets that are becoming common in business have the capacity to tailor-make forms without dependence on business forms paper, and often have image quality and graphics generation capability to rival offset printers. In the long run, this trend could seriously threaten the demand for forms bond and offset paper, executives warn.

Indeed, a revolution in office information management is taking place—what Lloyd Chambers of Great Northern Nekoosa called the "digitization of text." For paper consumption, this means that more and more information can and will be stored in computers rather than in paper files—with all that implies for use of bond, tablet paper, reprographic paper, forms bond, and offset paper. Many kinds of paper may be affected by the current round of experiments in electronic home banking services services, for example, with Bank of America and First Interstate Bank, two of the leaders in that field.

Bank data bases

Electronic funds transfer could eventually flatten growth of checkbook production also. And banks themselves are leaders in internal use of electronic filing, electronic forms, and electronic memos. Continental Bank, with 600 data bases in-house, is pushing hard to bring electronics into the office, and is said to expect to cut its internal paper use as early as 1982.

Many business forms are susceptible to the conversion to electronic transmission and storage. One executive cited an International Business Forms Industries estimate that 62% of all forms are used for internal documentation, and only 36% are used for sales documents. This executive estimates a large portion of that 62% may eventually move from forms bond to electronic storage—or at least may be printed on groundwood forms rather than free sheet forms bond.

If cheap, flat, portable display terminals become commonplace, consumption of book paper could suffer, with reference books the first to go, one marketing manager worried. Technical and special interest books represent 8% of the U.S. book publishing market, he added. He also noted an estimate in the API study that a single videodisk can hold as many images as are contained in the entire *Encyclopedia Brittanica*, pointing out the threat of videodisks to reference books.

Voice mail and computerized store-and-forward memo services may hurt demand for bond and envelope, observers believe, with one estimating that nearly 350 of the Fortune 500 companies will have electronic mail or message services of some kind—however primitive—within a year. He added that the current ratio in U.S. business of one terminal for every 20 desks is expected to increase to one terminal for every three desks by the year 1990.

Bills in envelopes

Another executive, however, pointed to a Univ. of Michigan study that indicates 59% of all first-class mail is involved with billing and payment, most of that moving from business to the home, and may be less susceptible to conversion to electronic form. The largest electronic mail system being planned, that of the U.S. Postal Service, will still depend on paper for hard copy at the receiving end.

Reprographic paper may be hurt by the development of cheap office copiers with duplexing capability—the ability to print on both sides in an effort to save paper. But xerographic may also benefit from technical innovation, as ever-cheaper copiers continue the current trend toward heavy utilization of the copy machine in the typical office. ☐

Mead's view: If you can't beat 'em, join'em

Confronted with the ugly prospect of paperless offices, paperless homes, and even paperless briefcases by the end of the century, paper companies have adopted every strategy from cautious watchfullness to burying their heads in the sand. One firm, however, has chosen to attack the problem head-on—by becoming, itself, a major force in the electronic revolution.

Mead Corp. doesn't take seriously a lot of the "paperless office" predictions, and it still expects to be running paper mills beyond the turn of the century. But it also wants to avoid becoming the victim of an expected flattening in consumption growth rates for many grades of paper.

Steering clear for now from the competitive Armageddon shaping up in the home information market—with corporate giants like AT&T and CBS planning to throw millions at the still unsuspecting consumer—Mead and its Mead Data Central unit decided first to build up expertise in electronic data-base management by serving a clearly defined category of users with specific information needs.

First, the firm launched Lexis, a legal data referencing service, and then more recently followed up with Nexis, offering the subscriber access to news articles. Less than a decade after launching Lexis, the service counts among its subscribers more than 1000 law firms, law schools, government agencies, and corporate legal departments—including among them Boise Cascade Corp.'s legal unit, according to Boise Cascade. The two services gross "between $40 million and $75 million/year," according to Robert M. O'Hara, senior vice president of Mead's Advanced Systems Group and father figure for ASG's major project, MDC; and Nexis is "growing faster than Lexis did at the same stage."

But more important than short-run profit, Lexis and Nexis have taught Mead a lot about selling electronic information, and have helped the company to sharpen its long-term product development strategy.

Industry data bases. O'Hara listed several potential directions for MDC to go in its exploration of data-base management, beginning with the Lexis/Nexis path—vending professional and industry data bases to a relatively small number of interested clients. Under the present system, subscribers rent a terminal and telephone hookup, which allows them to communicate directly with a central computer in Mead's Dayton, Ohio, headquarters. They have access to information that has been cranked into the central computer by a variety of methods, ranging from magnetic tape from news services, publishing companies, and law courts, to laser scanning in some cases—and keypunching at MDC central terminals by MDC workers, as a last resort.

Mead is considering further expansion in professional data bases, including financial information, patent law search, and chemical research capabilities; it is also looking into selling data bases for whole industries, with petroleum, banking, and paper among the possible choices. It is also keeping an eye on possible entry into the European market.

Electronic newsletters. Tying its Nexis experience at dealing with publications together with its interest in industry and professional data bases, O'Hara mentioned that "there may even one day be specialized industry or professional newsletters that could be distributed only electronically," using the MDC system.

Industry and professional data bases represent a relatively safe investment for an information company that has begun to accumulate considerable experience in this kind of service. By its nature, however, this kind of data-base service is expensive to set up and limits the vendor in its range of clients.

Electronic office files. Potentially much broader in scope is another possible project which O'Hara considers to be a "very viable option"—electronic office files, in which subscriber companies could begin to store the great mass of their office files on the MDC system. At that time, "when we get into broad-base private office files I think we'll have to do it through multipurpose terminals," O'Hara notes, with the Mead central computer being capable of communicating with whatever terminal the subscriber has in his office.

Under such a service, if an executive with a subscriber company wanted background information on a particular subject to help him write a speech, he might make use of Nexis. Then, if he wanted to send a memo to the chairman of the company summarizing his speech, he could store his personal file copy of the memo in an MDC computer, "under a code that allows only him to have access to the file" O'Hara explained. Finally, the executive could even send the memo electronically to his boss—without the message ever seeing a piece of paper.

O'Hara won't rule out the possibility that when that executive goes home after a hard day at the terminal, he will sit down in front of a Mead terminal in his den when he wants to figure out his personal finances—or read his boss' instantaneous reply to that electronic memo.

U.S. crude tall oil production

International Naval Stores meeting focuses on CTO production, outlook for fractionation capacity in U.S., Canada, and Scandinavia

By KEN SMITH, Senior Editor

□ Crude tall oil (CTO) production in the U.S. is expected to reach a record 937,000 tons in 1981 when final tabulations are completed. This estimate is based on the assumption that production in the latter half of the year will continue at the same pace set in the first six months. However, according to **E.E. McSweeney**, pres., Marcam Inc., with greater use of sawmill residues, increased cutting of younger trees, and higher hardwood utilization for sulfate pulping, CTO production will probably increase only 1% to 2%/year through 1985. Addressing approximately 350 attendees from 22 countries at the Eighth International Naval Stores meeting in New Orleans, La., McSweeney reported that average CTO production has increased from 3.3% (by weight) of total pulp production in 1975 to nearly 4.0% in 1980 due to improved recovery practices and a general increase in Southern pine-based sulfate pulping capacity.

Table 1. **Trends in U.S. pulp capacity**
(000 metric tons)

Year	Total all grades	Sulfate		Sulfate % of total
1950	13,622	BPG	2381	54.7%
		UPG	5069	
		Diss.	0	
1960	25,646	BPG	6559	61.1%
		UPG	8863	
		Diss.	247 e	
1970	39,538	BPG	12,875	72.8%
		UPG	15,281	
		Diss.	637 e	
1980	48,536	BPG	17,755	75.6%
		UPG	18,280	
		Diss.	627	

BPG = Bleached paper grades
UPG = Unbleached paper grades
Diss. = Dissolving and special alpha grades
e = estimated

In a session chaired by **Robert G. Carter** of Monsanto, reports were also given on the naval stores industry in Scandinavia and Canada, and on recent developments in the pulp and paper industry as they affect naval stores production. Attendance at the conference, which was followed by a two-day technical symposium, was the largest ever.

U.S. rosin production

According to McSweeney, tall oil recovery in the U.S. can be significantly improved. He estimates that CTO yield based on pulp should be as much as 6.6% vs the 4.0% currently recovered. He pointed to the fact that CTO yield from available black liquor soap averages only 51%, considerably less than the theoretical recovery rate.

McSWEENEY

The percentage of CTO distilled in the U.S. vs total CTO production has remained at about 88% since 1973. CTO exports are likely to increase in the future, but those increases will probably be offset by modest projected increases in domestic production. As would be expected from the record CTO production for the first half of 1981, a record amount of CTO was distilled during that period. Total distillation is expected to reach 770,000 tons for the year, as compared to the previous high of 762,000 in 1979.

Tall oil rosin (TOR) production averaged 30.4% of the total crude distilled from 1970 to 1979. However, TOR production slumped to only 27.7% in 1980. According to McSweeney, it is uncertain whether this decrease reflects a change in distillation practices or an accounting anomaly.

Rosin production from all sources (gum, wood, and TOR) in the U.S. was 345,000 tons in 1980. Rosin production is expected to increase slightly to 366,000 tpy by 1985. McSweeney predicted that gum rosin production will level out at 5000 tpy and that wood rosin production, with a boost from the Hercules Pinex process, will stabilize at 115,000 tpy. TOR yield should average 31% of the CTO production.

TOR consumption in the U.S. has been decreasing steadily since 1970, especially as used in the manufacture of paper and rubber. Papermakers have shifted from

may reach record level in 1981

paste size to emulsion size, and the trend is likely to continue. Rubber use is declining as automobile tires become smaller and give longer mileage.

In the other major use for rosin, printing inks and adhesives, there is a slight upward trend in consumption. Pressure-sensitive adhesives, which employ rosin-based or hydrocarbon resin tackifiers, are growing in output by at least 6%/year. Printing inks continue to be a major and growing outlet for variously modified rosin esters and resinates. The high cost of hydrocarbon derivatives has helped the competitive position of rosin in this market. However, McSweeney said that the naval stores industry must continue to improve its products to maintain its market share.

Paper industry developments

Ron Slinn, vice president of the American Paper Institute, spoke on paper industry trends that affect naval stores production. Slinn noted the huge increase in sulfate pulping capacity which has occurred since 1950. Over the past 30 years, sulfate pulping has grown by an annual rate of 5.5%, and now accounts for more than 75% of all U.S. capacity.

SLINN

Thermomechanical pulping has recently been a rapidly growing segment of the industry. Slinn predicted that between 1980 and 1983, TMP capacity will grow 60% to become almost 4% of the total U.S. pulping capacity. The significance of TMP growth to the naval stores industry is that the process does not recover spent chemicals; no byproducts are produced.

Slinn noted that in 1980, about 76% of total U.S. sulfate paper-grade pulp capacity was in the South and that 77% of total U.S. sulfate capacity was based on softwoods (with CTO produced). That capacity is expected to increase 6.3%/year to 1983, but regional distribution and grade structure are not expected to change.

The speaker emhasized that while the pulp and paper industry is first among U.S. manufacturing industries in oil consumption, third in coal consumption and electrical purchases, and sixth in natural gas use, it is currently 50% self-sufficient in energy. The industry has reduced its consumption of fossil fuels and purchased energy/ton of product by 29.3% since 1972. Fuel oil consumption has been reduced by 25%, while overall pulp output increased 11% during the same period. Thus, the industry's energy picture gives it a high level of security against either major escalations in conventional energy prices or severe curtailments of fossil fuel supplies.

Slinn stated that paper consumption in the U.S. traditionally follows the GNP. He foresees that the current economic doldrums will impact the industry most significantly in areas closely related to wood products operations. With reduced lumber and sawlogs demand, the supply of byproduct chips for papermaking is likely to

Table 2. **U.S. rosin production**
(short tons x 1000)

Year	Gum[1]	Wood[1]	Tall oil rosin[2]	Total
1970	23.4	201.7	207.8	432.9
1971	22.6	194.6	213.8	431.0
1972	23.7	184.1	222.1	429.9
1973	20.3	174.1	222.7	417.1
1974	14.6	157.7	198.5	370.8
1975	17.9	85.6	161.0	264.5
1976	16.9	132.0	202.2	351.1
1977	13.5	125.5	202.8	341.8
1978	9.4	120.1	212.0	341.5
1979	7.0	116.0	232.1	355.1
1980	5.9	115.0[3]	208.8	329.7

1. USDA
2. Pulp Chemicals Assn.
3. Estimated.

Table 3. **Crude tall oil prices in $U.S. for same end product value**

Year	**Scandinavia** (1.08 ton of CTO acid number 145)	**U.S.** (1.00 ton of CTO acid number 160)
1973	103	100
1974	135	100
1975	187	255
1976	157	137
1977	161	143
1978	182	165
1979	214	170
1980	245	170

1. Average Swedish export price
2. Average according to *Chemical Marketing Reporter*

decrease. High interest rates, and reduced cash flows and profitabilty, have forced many companies to postpone capital spending programs, including capacity additions.

Slinn concluded by saying that the industry faces increased challenges from electronics and plastics, which could lead to decreased demand. However, the overall outlook, especially for exports, is good.

Scandinavian naval stores

KOLOSH

Frans Kolosh, group vice president of Stora Kopparberg, reported that CTO production in Scandinavia has reached a peak of about 280,000 tpy, which is sufficient to meet only about 80% of the present fractionation capacity in Europe. He noted that the quality of CTO produced in Scandinavia is generally lower than that from the Southern U.S. (average acid number of 145 vs 160 in the South). Due mainly to increased fuel costs, CTO costs to fractionators for the same end-product value are about 30% higher ($252/ton vs $190/ton) in Scandinavia.

Kolosh stated that approximately 40,000 tpy of CTO contaminated with birch is produced annually in Scandinavia. This "birch oil" has an acid number of 120 or less and a rosin content of about 20%, making it uneconomical for fractionation. At present, most of this oil is burned for fuel in the pulp mills.

Kolosh said he believes that the European naval stores industry can improve its competitiveness by developing a differentiated and broad range of tall oil fatty acids (TOFA) and TOR product specialties and/or derivatives which considerably increase the added value of the available CTO. Attempts in this direction are exemplified by high-purity TOR, and TOFA with improved color characteristics recently developed by European fractionators.

Due to genetic differences, polyunsaturated fatty acid contents in Scandinavian TOFA is higher than southern U.S. TOFA. Such differences could be used to develop more competitive European TOFA qualities for special uses, such as highly conjugated fatty acids. Finally, Kolosh believes technology can be developed to process significant volumes of birch oil into valuable byproducts. He also called for a joint effort among naval stores producers to develop the technology necessary to recover pitch, which is a byproduct of CTO fractionation that is currently burned.

Canadian naval stores outlook

NORMAN

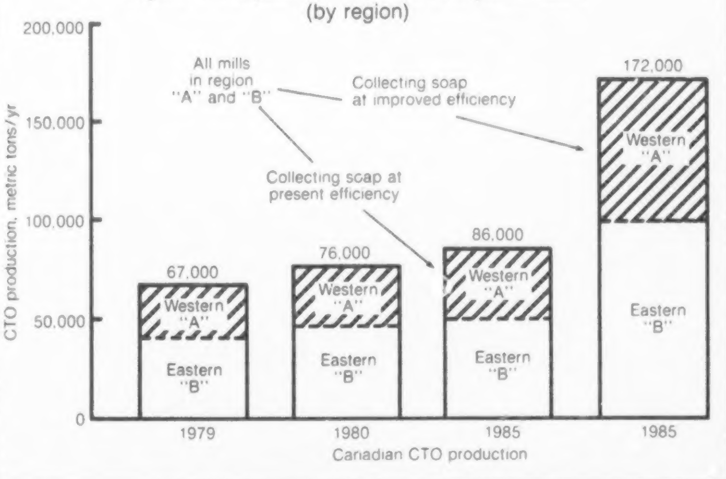
According to **Hugh Norman**, vice president and general manager, B.C. Chemicals Ltd., his company is the largest CTO producer in Canada with a production rate of 15,500 tons in 1980. Total CTO production in Canada was 84,000 tons in 1980. Norman noted that, of 21 Canadian pulp mills with soap-collection potential, only 16 are collecting it, and only 7 of the mills operate plants to produce CTO. CTO recovery at those mills averaged 44 lb/a.d. ton of pulp production at mills in eastern Canada, and 35 lb/a.d. ton at western Canadian mills.

Norman estimated that, if all mills were to collect soap, by 1985 CTO production would rise to 96,000 tpy at present recovery efficiencies (about 40%). If all mills improved recovery to 80%, production could reach 191,000 tpy. Thus, Canada remains the largest untapped source of CTO in the western world.

The quality of Canadian tall oil is generally highest in the East with an average acid number of 142, and is slightly lower in the West with an average acid number of 136. The difference is due to the varying species being pulped and increased use of sawmill chips in the West. Average rosin and fatty acid contents of Eastern tall oil are nearly equal, while fatty acid content of Western tall oil is about 13% greater than the average rosin content.

Canada is a net exporter of CTO because overall production exceeds (by about 60,000 tpy) its fractionation capacity. The U.S. is its largest export consumer, having bought 42,000 tons of CTO, 31,000 tons of soap in 1980.☐

Figure 1. **Projected Canadian CTO production**
(by region)



Titanium dioxide available, prices rise substantially

By BARRY SHOCKETT

The overall titanium dioxide (TiO_2) market has held up surprisingly well, and production in 1981 should slightly exceed the 1980 level. The paper industry has remained a good growth area for TiO_2, and usage rose 6% in 1981; it should increase 5% in 1982. The overall market has not reached the level hoped for since the depressed U.S. economy has affected the major end-user, the paint industry. The paint industry is closely tied to the automotive and housing industries, and both of these markets were depressed in 1981. In addition, paint manufacturers are facing increased competition in residential housing markets by other wall coverings such as paper and paneling. Imports jumped up in 1981 to about 128,000 tons, reversing a downward trend since 1978.

The Canadian economy was in no better shape last year than that of the U.S., and paint industry TiO_2 usage was down. However, consumption in 1981 by paper mills was also down, primarily due to lost printing/writing paper tonnage caused by the labor problems in eastern Canada, which began in late 1980 and continued until the second quarter of 1981.

U.S. statistics for titanium dioxide (000 short tons)

	1978	1979	1980	1981e
Capacity	1000	1000	1000	1000
Production	701	741	714	725
Imports	118	105	98	128
Exports	38	49	42	60
Apparent U.S. consumption	781	797	770	793

Source: Bureau of Census, U.S. Dept. of Commerce, and P&P estimates

Canadian statistics for titanium dioxide (000 short tons)

	1978	1979	1980	1981e
Nameplate capacity	79.4	79.4	79.4	79.4
Production	76	75.5	77.6	78.3
Exports	17.1	17.1	14.3	14.3
Imports	7.7	12.7	8.4	6
Apparent consumption	66.6	71.1	71.7	70

TITANIUM DIOXIDE

UNITED STATES

Uses: Titanium dioxide pigment is used by the paper industry in printing/writing papers and paperboard mills as a filler and coating pigment. Both rutile and anatase grades are used, with the majority comprised of anatase. The largest end-use is paints; others include plastics, rubber, and ceramics.

Demand: Production through the first three quarters of 1981 was ahead of the 1980 level, and total 1981 production is estimated at 725,000 tons. With imports up 30% over 1980, apparent U.S. consumption will be an estimated 793,000 tons, up about 3% over 1980. Paper industry usage was up about 6% in 1981, primarily as a result of a strong performance by the coated paper sector.

Sources: U.S. producers, in decreasing order of capacity are: DuPont, SCM Glidden, American Cyanamid, Gulf+Western, NL Chemicals, and Kerr-McGee.

Availability: TiO_2 is readily available, and operating rates have been running between 70% and 72% for the past three years. 1980, market; 1979, anatase, market; rutile, tight.

Pricing: List prices for anatase and rutile grades rose 6c and 7c/lb respectively in August 1981 (the second increase in 1981), bringing the published delivered prices to 69.5c to 70c/lb for anatase and 75c to 76c/lb for rutile. The previous boost at the beginning of 1981 was of the same magnitude. Pricing history: 1980, anatase, 57c/lb; 1979, anatase, 53c/lb; 1978, anatase, 46c/lb.

Forecast: If automotive and housing markets improve in 1982, total usage should grow 2% to 3%. Plastics appear to be a strong growth area, if end-use applications continue to grow, which will depend on the overall economy.

CANADA

Uses: Fine paper mills account for about 90% of the anatase TiO_2 used, with paperboard mills consuming the balance. The largest consumer is the paint industry, followed by plastics and rubber applications.

Demand: Canadian apparent consumption was down slightly in 1981 at 70,000 short tons. This was due to weak paint and paper markets. Paper industry usage was 6600 tons (9.4%) down from the 7200 tons (10%) in 1980. Plastics and rubber applications increased their share to about 32.2%. Imports in 1981 were down 28.6% from 1980 levels, while 14,300 tons were exported, the same amount as in 1980.

Sources: There are two domestic producers, NL Chem Canada and Tioxide Canada. Imports are mainly from the U.S., although some are from Europe.

Availability: Although TiO_2 producers have been operating their plants close to capacity, any substantial increase in domestic demand could be satisfied by reducing exports. 1981, untreated anatase, market; 1980, market.

Pricing: There have been no price changes since July 1981 when dry untreated anatase rose 5.5c/lb to 74.5c/lb, bags, delivered. Slurry shipments are an additional 0.5c/lb. Pricing history: 1980, 59c to 69c/lb; 1979, 48.5c to 59c/lb.

Forecast: Total titanium dioxide usage is expected to resume its 2% to 3%/year growth in 1982, if construction and automotive markets improve. Paper industry usage should grow at close to 10%/year, and plastics consumption through 1985 should increase almost 12%/year.

Mr. Shockett is consulting editor-chemical markets for PULP & PAPER.

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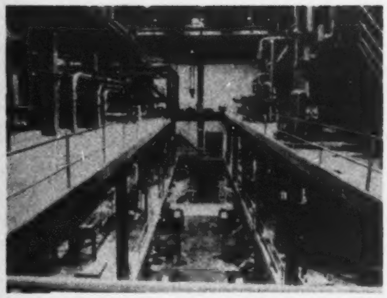
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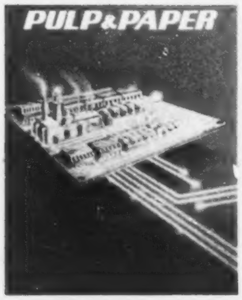

Cover: Advanced process control—trends, developments, is the subject of a special seven-article focus in this issue. Cover art by Rik Olson depicts the continually expanding role of this vital technology in the pulp and paper industry.

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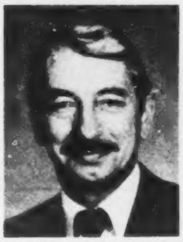

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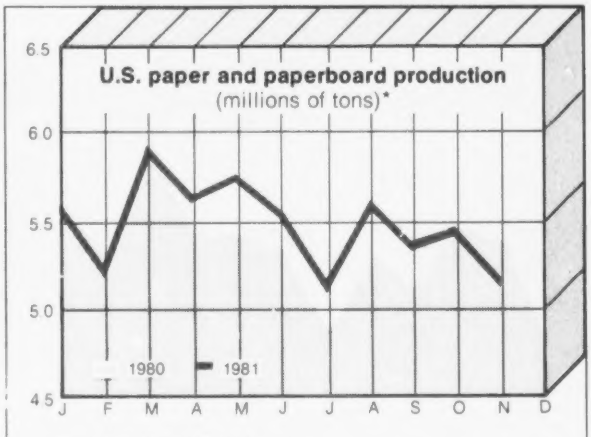
MONTH IN STATISTICS

U.S. paper and paperboard production came to 5.2 million short tons in October, bringing the seasonally adjusted annual rate for the October-November period down to 62.9 million tpy, compared to 65 million tpy in the previous two-month period, according to the American Paper Institute. The declines in the period followed relatively high rates of production, so output in the first 11 months was at a seasonally adjusted rate of 65 million tpy, 2.4% over its year-earlier level.

Among major grades, newsprint was the only paper grade to show strength for the month, up 11% over year-ago levels. Uncoated groundwood and free-sheet grades continued their slowdown in November, and coated papers showed a weakening trend. Declines in paperboard were steeper than those for paper, with production for all major grades below year-ago levels. Construction grade output was about 15% below year-ago.

Total Canadian newsprint shipments were 773,000 metric tons in November, up 2.0% over a year ago, according to the Canadian Pulp & Paper Assn. Mill operating rates were 96% vs 93% in November 1980, bringing the year-to-date operating rate to 94%.



*Not seasonally adjusted

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	November	438	10.9	5,265	12.3
Uncoated groundwood (s)	November	118	−1.7	1,451	−3.2
Coated paper (s)	November	399	0.5	4,976	6.8
Uncoated free sheet (s)	November	828	−0.8	7,974	−0.5
Unbleached kraft packaging and industrial (s)	November	319	1.9	3,917	−1.0
Tissue	November	370	0.5	4,505	2.5
Total paper	**November**	**2,531**	**2.2**	**31,265**	**3.3**
Kraft linerboard, unbleached	November	1,175	−1.7	14,892	3.4
Semichemical medium	November	370	−8.4	4,790	0.6
Bleached paperboard	November	316	−0.9	3,990	2.6
Recycled paperboard	November	551	−8.6	7,206	1.4
Total paperboard	**November**	**2,481**	**−4.7**	**31,976**	**2.3**
Total paper and paperboard*	**November**	**5,173**	**−2.0**	**65,448**	**2.1**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	October	4,873	6.9	52,691	3.4
Market pulp production	October	559	1.6	6,275	−4.1
Wastepaper consumption at paper/board mills	October	1,261	1.0	14,812	4.4
Pulpwood consumption (cords)	November	7,058	4.1	80,984	−0.1
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	November	18.189	−2.6	227.439†	2.4
Containerboard inventories at box plants	Nov. 1	2,437	29.6		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	October	784	10.7	8,357	−6.2
Imports of Canadian newsprint	October	645	11.8	6,911†	−3.6
U.S. paper exports (including products)	October	330	−39.6	4,741	−9.4
Exports of unbleached kraft linerboard	November	151	−7.4	1,864	−23.0
Exports of woodpulp	October	275	−19.4	3,715	−4.3
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	November	773	12.0	8,117†	2.9
Operating rates	November	96%	93%	94%	95%
Inventories held by U.S. consumers	Nov. 30	1,477	−0.3		
Woodpulp shipments (export only)	November	n.a.		n.a.	
Operating rates	November	n.a.		n.a.	

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn.
*Includes construction and wet machine grades. †Not annualized. ‡Not directly comparable to year ago because of coding change. (s) = shipments.

(News section continues on page 21)

Linerboard: Lower operating rates due to soft demand, new capacity

Statistics	**1980**	**1981**	**1982e**
Production, 000 tons	14,232	14,651	14,330
Capacity, 000 tons	14,586	15,340	16,086
Utilization rates, %	97.6	95.5	89.1
Imports, 000 tons*	30	35	25
Exports, 000 tons*	2,293	1,800	1,930
Apparent U.S. consumption			
000 tons	11,969	12,886	12,425
lb/capita	105.1	112.1	107.0
000 tons/$ billion real GNP	8.08	8.50	8.35

*Commerce Dept. data. e=estimated

Grade structure: Unbleached linerboard is made in a wide range of basis weights. The standard kraft liner is 42 lb/1000 ft², but other important grades are made in weights of 26, 33, 38, 69, and 90 lb. Major end use is in containerboard for corrugated containers. A small amount of liner is produced from recycled fiber (and is referred to as "test" liner) but is not included in these figures.

Production/capacity: Linerboard production in 1981 rose an estimated 2.9% to 14.65 million tons, helped by an increase of about 2.1% in corrugated box shipments and by inventory building. Inventories of both liner and medium at box plants and mills rose nearly 600,000 tons last year to more than 2.5 million tons by Dec. 1.

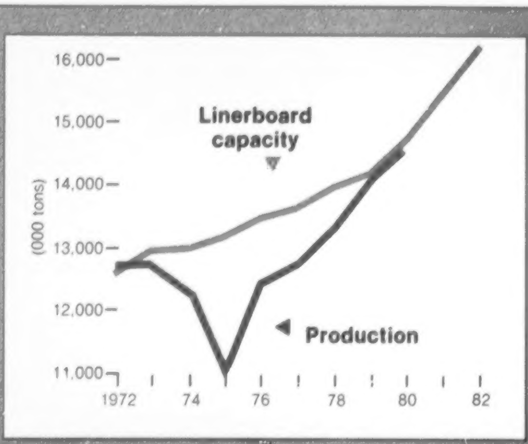
Export shipments of unbleached liner dropped about 22% from 1980's record level of 2.29 million tons, reflecting recession in Europe and Japan, the increased value of the U.S. dollar, and lower shipments to the People's Rep. of China, which made heavy purchases in 1980.

Domestic demand began to weaken in the fourth quarter, and many linerboard mills took extended holiday downtime in December. Operating rates for the year, however, averaged a still respectable 95.5%.

Outlook: With little or no domestic economic growth forecast for 1982, corrugated box production is projected to rise by 0.7% to 260.45 billion ft², resulting in domestic liner demand of 12.43 million tons. Export shipments are forecast to rise about 7% to 1.93 million tons, led by a recovery in demand from the Far East. Assuming inventory levels remain relatively unchanged, this would indicate total unbleached liner production of 14.33 million tons, down 2.2% from 1981.

Capacity is expected to jump by 4.9% to 16.09 million tons in 1982, with the startup of International Paper's 460,000-tpy Mansfield, La., machine and Stone Container's 105,000-tpy Florence, S.C., machine in late 1981; and Weyerhaeuser is scheduled to bring on a new 200,000-tpy machine at Valliant, Okla., later this year.

The sharp jump in capacity, together with the projected decline in production, could push operating rates as low as 89% for all of 1982. Phaseout of 185,000 tpy of liner at International Paper's Georgetown, S.C., mill in the first quarter of 1981 (not included in the capacity figures), however, will make actual rates somewhat higher. But any inventory liquidation from current high levels or rescheduling of kraft paper machines to liner production due to competition from plastics would have an adverse affect on operating rates.



Estimated annual capacities of major U.S. companies are:

	Annual capacity[1] (000 tons)	Capacity share (%)
1. International Paper Co.[2]	1625	10.1
2. Union Camp Corp.	1250	7.8
3. Weyerhaeuser Co.	1150	7.1
4. St. Regis Paper Co.	910	5.7
5. Champion International Corp.	880	5.5
6. Mead Corp.[3,4]	780	4.8
7. Inland Container (Time)[3,4]	780	4.8
8. Container Corp. of America	750	4.7
9. Continental Forest Industries	700	4.4
10. Owens-Illinois Inc.	695	4.4
11. Great Northern Nekoosa Corp.	680	4.3
12. Westvaco Corp.	600	3.7
13. Stone Container	580	3.6
14. Willamette Industries	500	3.1
15. Southwest Forest Industries	430	2.7

1. Machines that swing between linerboard and kraft paper make exact capacity estimates difficult.
2. Excludes 185,000 tpy of capacity to be phased out this spring as part of Georgetown, S.C., mill conversion to bleached grades.
3. Includes 50% share in Georgia Kraft Corp.
4. Includes some carrier stock.
5. Excludes 120,000 tpy from machine to be converted to newsprint at Snowflake, Ariz., mill this spring.

U.S. capacity (1982)**: 16.086 million tons**
Capacity share of top five companies: 36.1%
Capacity share of top ten companies: 59.2%

Pricing: Weakening demand and startup of the two new machines triggered a round of $30/ton rebating from $300 list-price levels in December and January. The poor pricing performance of linerboard in recent years has resulted in lower profitability than on many grades, and discouraged new capacity additions (42-lb at year-end): 1980, $270/$300; 1979, $270; 1978, $220; 1977, $195; 1976, $210; 1975, $202.

Export list prices have remained at the same $377 level (c.i.f. northern Europe) since the second quarter of 1980 and have shown the following pattern (36 lb+ at year-end): 1979, $323; 1978, $255; 1977, $222; 1976, $222; 1975, $276. There has been considerable discounting, however, from list prices in Europe and most Far Eastern markets.

U.S. capacity hikes in 1982-84 to slow slightly from fast 1980-82 pace

Biggest growth seen in semichemical paperboard; coated groundwood and newsprint will jump too, while drop is seen in construction grades

By DAVID R. ALLAN, News Editor

☐ U.S. paper companies are slowing their capacity growth rate slightly from the hot pace of the 1980-82 period, and planned expansions in the 1982-84 time period are also below the average for the years 1967-81, according to the American Paper Institute's annual capacity survey.

The biggest increases in capacity envisioned in the latest survey are in semichemical paperboard, semichemical pulp, newsprint, printing and writing papers, and mechanical pulp, while capacity in the construction grades is expected to drop marginally. The strength in semichemical capacity, which is a continuation of a trend shown in last year's study, will redress by 1984 the current imbalance with linerboard, where capacity is growing at only 2.1%/year.

Overall paper and board capacity will grow by 5.0 million tpy during the three years covered by the survey, to 77.2 million tpy, while woodpulp capacity will increase by 3.4 million tpy to 60.3 million tpy. These increases represent growth rates of 2.3%/year and 2.0%/year, respectively—slightly below the 2.4% and 2.5% annual averages of the 1967-81 period and the 2.9% and 2.8% annual averages expected two years ago for 1980-82.

Newsprint rate slows

The torrid pace of U.S. newsprint capacity increases in 1980 and 1981—when 1.1 million tpy was added, exceeding the total gain in capacity over the previous ten years—will slow down in 1982-84 to a 608,000-tpy gain, a 3.7%/year growth rate, with a new machine and the conversion of an existing machine being the only announced projects.

Coated groundwood mills will continue the recent capacity growth trend, which has already led to a temporary surplus in supply. The 21.7%/year rate of coated groundwood mills leads the printing and writing grades, where capacity increases overall will average 3.5%/year, totaling 1.9 million tpy of new capacity through the year 1984. Uncoated free-sheet manufacturers will increase capacity by 8.4%, bringing on five new machines, while coated free-sheet and uncoated groundwood mills will show modest capacity increases.

Slow growth will also be seen in tissue capacity, and modest scheduled increases might even be partially offset by continued shutdown of old machines. Steady, although unexciting, expansion in tissue demand, which has averaged 1.5%/year in recent years, will be matched by a 1.7%/year capacity increase during the 1982-84 period, with capacity going up by only 260,000 tpy. This is slower than expected in recent surveys, and includes only one entirely new machine.

Only one new liner machine

One kraft linerboard machine started up early and

Table 1. **U.S. pulp and paper industry average annual capacity growth**

	1970-79	1979-81	1982-84
Total paper/board	**2.1%**	**2.4%**	**2.3%**
Total paper	**2.3**	**2.7**	**2.9**
Newsprint	2.6	6.5	3.7
Printing, writing and related	2.9	2.5	3.5
Packaging, industrial converting	0.9	0.3	1.3
Tissue	2.4	3.5	1.7
Total paperboard	**2.0**	**2.5**	**2.0**
Unbleached kraft	2.7	3.1	2.1
Solid bleached	2.0	1.9	0.2
Semichemical	2.2	2.7	4.0
Recycled	0.4	1.5	1.3
Total construction grades*	**1.7**	**0.2**	**0.5**
Total woodpulp	**2.1**	**2.4**	**2.0**
Dissolving, special alpha	0.8	0.6	—
Sulfite	2.0	1.6	0.8
Sulfate	2.8	2.5	1.5
Semichemical	2.1	1.7	3.9
Mechanical	0.7	4.6	3.2

*Includes wet machine board.
Source: American Paper Institute.

two major expansions have been delayed beyond 1984, with the result that only one new liner machine is now scheduled to start up in this period. Capacity will still grow by 1.1 million tpy, a 2.1%/year rate, down from the 2.5%/year rate that was anticipated for 1981-83 in last year's survey.

Working to offset the recent supply imbalance in favor of linerboard, U.S. semichemical paperboard manufacturers will add capacity at a 4%/year rate, the hottest growth rate in the current survey. This only represents one new machine, but also includes tonnage from a new machine that started up in December 1981, along with improvements and an absence of currently planned permanent shutdowns.

While the containerboard grades are growing at a healthy rate, capacity of solid bleached sulfate board will be flat during this period, and indeed between 1980 and 1981 it even dropped by 165,000 tpy, a good indicator for future operating rates. However, this follows a period in the late 1970s when capacity was added at a rapid rate, however.

Recycled paperboard mills plan to add 352,000 tpy of capacity in the period between 1982-84. However, a further 415,000 tpy of currently idled capacity could become permanently idled during the period. This would come on top of 332,000 tpy already shut down and removed from the present survey.

Suffering from a similar erosion of old capacity, capacity in the construction grades will decrease by 0.5%/year. This is in addition to a net reduction of 144,000 tpy that has already been recorded between 1980 and 1982 estimates. During the period from 1980-82, 298,000 tpy was idled.

Dramatic TMP increase planned

Sulfate and soda pulp growth rates will fall to 1.5%/year, which is well below the long-term growth rate of 3% and also less than the growth rate of papers and boards produced from these pulps—representing postponement of several large expansion projects, increasing use of wastepaper, and fuller utilization of existing pulp capacity. Capacity will increase by 1.9 million tpy, with the 3.9%/year growth rate of semichemical pulp, fueled by the accompanying jump in semichemical board, leading the way along with mechanical pulp's 3.2%/year rate.

Thermomechanical pulp capacity will grow by 464,000 tpy, which is a 10.7%/year growth rate. This will occur largely on the strength of additions to newsprint capacity.

Table 2. **Paper/board annual capacity, 1981-84**
(000 short tons)

	1981	**1982**	**1983**	**1984**
Total paper/board	**72,148**	**74,558**	**76,031**	**77,162**
Total paper	**33,639**	**34,927**	**35,746**	**36,651**
Newsprint	5299	5583	5710	5907
Printing, writing	17,331	18,011	18,556	19,230
Uncoated groundwood	1658	1774	1779	1784
Coated groundwood	3081	3364	3652	3750
Coated free sheet	2226	2254	2359	2492
Uncoated free sheet	8791	9017	9123	9532
Cotton fiber	143	142	143	144
Thin papers	373	372	372	373
Solid bleached bristols	1060	1088	1127	1155
Packaging and industrial converting	5947	6140	6183	6191
Unbleached kraft	3991	4167	4196	4223
Bleached packaging and industrial converting	558	559	559	545
Specialty packaging	533	539	540	531
Special industrial	865	875	888	892
Tissue	5062	5193	5297	5322
Total paperboard	**34,245**	**35,428**	**36,087**	**36,313**
Unbleached kraft	16,685	17,422	17,661	17,765
Kraft linerboard	15,340	16,086	16,307	16,396
Solid bleached	4015	4049	4048	4037
Semichemical	4952	5180	5477	5566
Recycled	8593	8776	8901	8945
Total construction paper/board	**4264**	**4203**	**4198**	**4198**

Source: American Paper Institute.

Table 3. **Woodpulp annual capacity, 1981-84**
(000 short tons)

	1981	**1982**	**1983**	**1984**
Total woodpulp	**57,010**	**58,470**	**59,603**	**60,303**
Dissolving	1590	1590	1590	1590
Chemical paper grades	43,172	44,092	44,733	45,148
Sulfite paper grades	1898	1905	1911	1946
Sulfate, soda paper grades	41,274	42,187	42,822	43,202
Bleached softwood*	11,649	11,843	12,031	12,194
Bleached hardwood*	8530	8683	8839	9001
Unbleached	21,095	21,661	21,952	22,007
Semichemical	4665	4826	5160	5228
Mechanical	7513	7890	8049	8226
For paper, paperboard	5482	5870	6029	6246
For other paper, board	2031	2020	2020	2020
Screenings	70	71	71	71
Total machine-dried pulp	**9423**	**9578**	**9730**	**9772**
Dissolving	1590	1590	1590	1590
Chemical paper grades	7726	7888	8040	8081
Sulfite	506	489	489	489
Bleached sulfate	7028	7228	7387	7429
Unbleached sulfate	192	170	164	164
All other	107	100	100	100

*Includes semibleached.
Source: American Paper Institute.

Table 4. **Market pulp capacity, 1981-84**
(000 short tons)

	1981	**1982**	**1983**	**1984**
Total market pulp	6978	7022	7110	7029
Dissolving	1563	1563	1563	1563
Chemical paper grades	5398	5449	5537	5456
Kraft	5035	5143	5231	5150
Bleached*	4860	4990	5086	5004
Unbleached	175	153	146	146
Sulfite	363	305	305	305
All other	17	10	10	10

*Includes semibleached
Source: American Paper Institute

Wastepaper consumption continues to rise very slowly as a percentage of total fiber supply, growing from 22.8% in 1980 to 23.2% in 1984. Consumption is expected to rise from 15.1 million tons in 1980 to 17.8 million tons in 1984.

Market pulp capacity will remain flat during this period, with no major grade showing significant increases, in contrast with 5.2%/year growth rates since 1977. Use of existing pulp capacity to provide fiber for new paper or board machines, along with the announced delay in start-up of at least one major market pulp mill, were named as reasons for this by API.

API statistics also showed that between 1976 and 1980, the percentage of paper and board capacity represented by mills over 175,000 tpy in size was rising from 60.7% to 65.1%, while the capacity of paper and board mills integrated to woodpulp was rising from 74.0% of all capacity to 77.2%.

New machines will provide 3.36 million tpy of planned new capacity, with greenfield mills representing only 235,000 tpy and various improvements another 1.4 million tpy.

In the three years from 1980 through 1982, API removed 1.4 million tpy of permanently idled capacity from its lists and says that another 609,000 may go in the next survey. □

Table 5. **New paper and paperboard machines, 1982-1984**

Grades	**Number of machines**
Paper	—
Newsprint	1
Coated gwd.	3
Coated free sheet	1
Unctd. free sheet	5
Unbld. kraft paper	1
Tissue	1
Paperboard	—
Unbleached	—
Kraft linerboard	2
Semichemical	1
Total	**15**

Table 6. **Mills and machines shut down, 1980-82**

	Machines	**Mills**	**Annual capacity** (000 short tons)
Paper			
Newsprint	—	—	—
Printing-writing	16	2	186
Packaging and industrial converting	8	2	97
Tissue	18	7	138
Paperboard			
Unbleached kraft	4	—	262
Bleached kraft	—	—	—
Semichemical	3	1	128
Recycled	18	8	332
Construction grades	17	11	298
Total	**84**	**31**	**1441**

Table 7. **Announced major capacity additions**

Company	**Location**	**Grade**	**Annual capacity**
1981			
Boise Cascade	Rumford, Maine	Coated groundwood	160
Buckeye Cellulose	Oglethorpe, Ga.	Bleached sulfate pulp	300
Fort Howard Paper	Muskogee, Okla.	Tissue	85
Georgia-Pacific	Palatka, Fla.	Tissue	60
International Paper	Mansfield, La.	Unbleached kraft linerboard	460
International Paper	Mansfield, La.	Semichemical paperboard	270
Madison Paper	Madison, Maine	Uncoated groundwood	160
Mead*	Chillicothe, Ohio	Uncoated free sheet	154
North Pacific Paper	Longview, Wash.	Newsprint	210
Scott Paper	Everett, Wash.	Tissue	54
1982			
Mead	Escanaba, Mich.	Coated groundwood	200
St. Regis Paper	Pensacola, Fla.	Unbleached kraft paper	236
St. Regis Paper	Sartell, Minn.	Coated groundwood	170
Stone Container**	Florence, S.C.	Unbleached kraft linerboard	105
Weyerhaeuser	Columbus, Miss.	Coated groundwood	175
Weyerhaeuser	Valliant, Okla.	Unbleached kraft linerboard	200
Willamette Industries**	Hawesville, Ky.	Uncoated free sheet	100
Wisconsin Tissue*	Menasha, Wis.	Tissue	65
1983			
Abitibi-Price	Augusta, Ga.	Newsprint	225
MacMillan Bloedel	Pine Hill, Ala.	Semichemical paperboard	210
Scott Paper	Skowhegan, Maine	Coated free sheet	200
1984			
Champion	Courtland, Ala.	Uncoated free sheet	150
Crown Zellerbach	Camas, Wash.	Uncoated free sheet	160
Union Camp	Eastover, S.C.	Uncoated free sheet	215
Weyerhaeuser	Columbus, Miss.	Uncoated free sheet	200

*Will replace existing facilities, net increase not announced
**Machine started up in late 1981, after release of survey but ahead of schedule

Papermakers' alum continues steady course

By BARRY SHOCKETT

Consumption of papermakers' alum has not fluctuated to any marked degree and is not expected to show any startling swings in the immediate future.

Most aluminum sulfate end-use markets in the U.S. and Canada are mature, therefore end-uses have not changed appreciably over the years. The exception is sewage treatment for phosphate removal in Canada.

The trend to neutral or alkaline sizing has clouded the long-range outlook for alum and could reduce consumption significantly by 1990.

U.S. statistics for aluminum sulfate, 17% Al_2O_3 (000 short tons)

	1978	1979	1980	1981e
Nameplate capacity*	2300	2400	2300	2550
Production	1309	1313	1182	1302
Shipments	1214	1216	1151	1296
Imports	20	24	26.8	28
Exports	23	26.5	11.6	26.5
Apparent U.S. consumption	1211	1213.5	1166	1297.5

*Based on industry estimates of operating rates
Source: Bureau of Census, Dept. of Commerce

Canadian statistics for aluminum sulfate (000 short tons)

	1978	1979	1980	1981e
Nameplate capacity	253.5	275	275.5	275.5
Production	185.5	195.5	199	202
Total demand	173.5	177.5	178.5	182.5
Internal paper sizing	53	55	55	56
Other pulp and paper	54	54	53	54
Municipal water/sewage	50	51.5	53	54.5
Miscellaneous*	16.5	17	17.5	18
Exports	15	22	22	23
Imports	3	4	1.5	3.5

*Including pigments

ALUMINUM SULFATE

UNITED STATES

Uses: Aluminum sulfate is used in the paper industry for process water treatment, pitch control, and internal rosin sizing. Nonpaper applications are dominated by potable-water and waste-water treatments.

Demand: In 1981 the paper industry used an estimated 656,000 tons of alum, or 51% of the total demand of about 1.3 million tons. Potable water and waste treatment required about 490,000 tons (38%).

Sources: The production of aluminum sulfate, which consists of 15 manufacturers, is dominated by three major producers. Allied Chemical, American Cyanamid, and Stauffer Chem are the three major producers accounting for 75% to 80% of industry capacity. Since 1979, annual capacity increases, have averaged 4.5%.

Availability: There is ample industry capacity available (almost 50%) to handle any eventuality, and no shortages are foreseen.

Pricing: Prices of alum have not changed since July 1, 1981, when the price in the northeast and north-central areas rose $12/ton to $133/ton for bulk, liquid (17% Al_2O_3), f.o.b. works, freight equalized. For the past two years alum prices have been raised at the beginning of the year and in mid-summer. However, no increases are expected in 1982 much before the summer months. Pricing history: 1981, $121-$131/ton; 1980, $101-$109/ton; 1979, $89-94/ton.

Forecast: The paper industry's share of total alum demand in 1982 is expected to remain constant (51%), although actual mill usage may decline slightly. On the other hand, waste-water treatment's portion of the market may increase a percentage point. Total alum demand should be between 1.2 and 1.3 million tons.

CANADA

Demand: Over the past three years between 60% and 62% of total alum consumption has been accounted for by the pulp and paper industry, slightly more than 50% for rosin size and the balance for pitch control and other mill applications. In 1980, 55,000 tons of aluminum sulfate were used for rosin sizing and an additional 53,000 tons for pitch control. Total alum consumption in 1980 was 178,500 tons. Last year, the pulp and paper industry used an estimated 110,000 tons (56,000 tons for sizing applications) out of a total domestic demand of 182,500 tons.

Sources: There are 13 plants producing aluminum sulfate in Canada. The two major producers, Alcan Smelters & Chemicals and Allied Chemical Canada, account for almost 80% of the total capacity. The next largest include Inland Chemicals (a CIL subsidiary), Border Chemical, and United Chemicals.

Availability: Following a more than 100% capacity expansion by Inland in 1980, total Canadian capacity is sufficient to handle future demands through the 1980s. 1982, market; 1981, market; 1979, market to tight.

Pricing: The price of liquid (17% equivalent Al_2O_3) aluminum sulfate, unchanged for most of 1981, rose to $145/metric ton ($135/short ton), f.o.b. plant on January 1. It ranged from $111-$132/metric ton ($100.70-$119.75/short ton) in 1981. Pricing history: 1980, $86-$100.70/ton; 1979, $79-$86/ton.

Forecast: Consumption of alum by the pulp and paper industry may slow down in the long term, but should grow at an annual rate of 2% to 3% to 1985. 1982 of 112,500-113,000 tons may be down slightly because of the sluggish economy.

Mr. Shockett is consulting editor-chemical markets for PULP & PAPER.

PULP & PAPER

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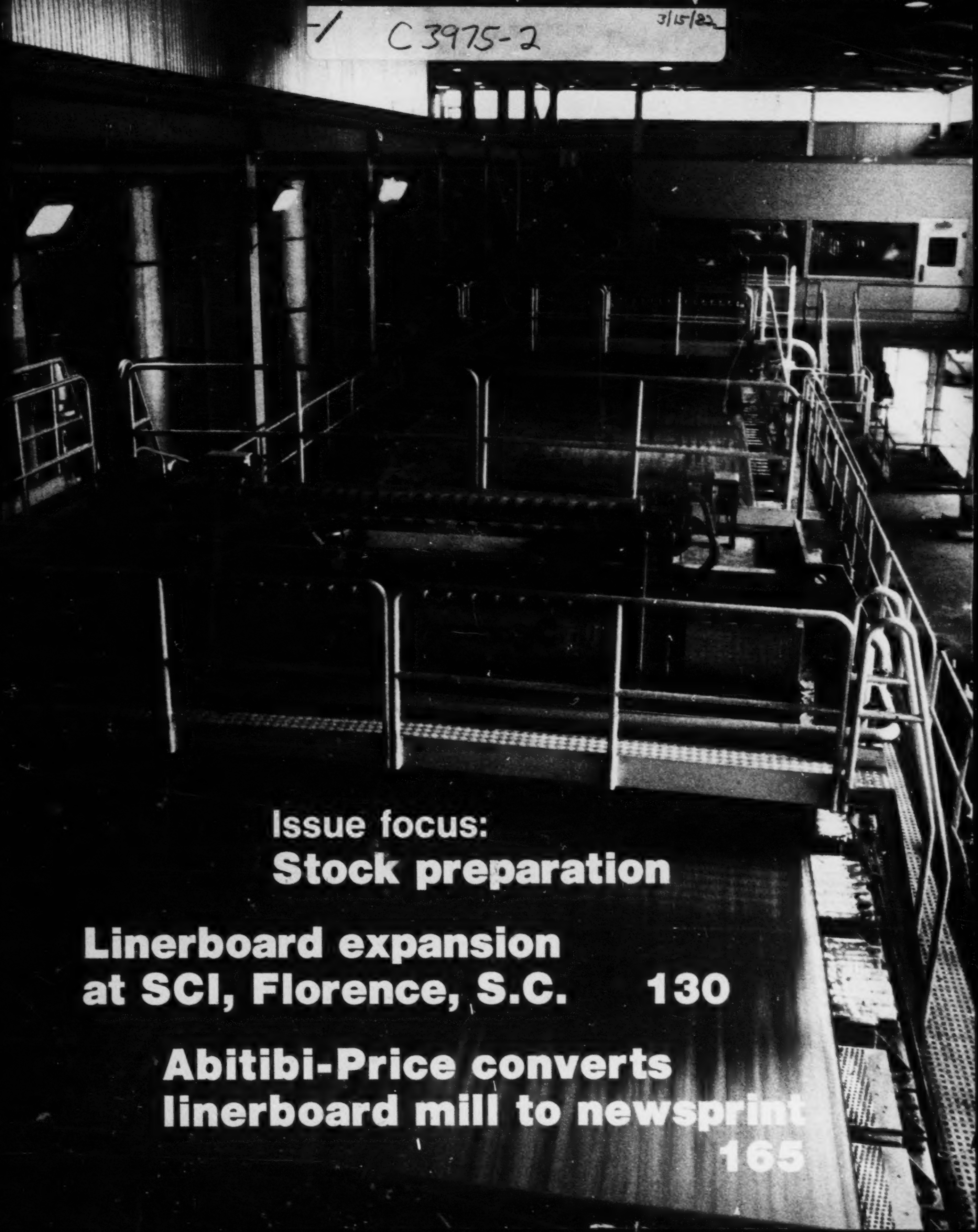

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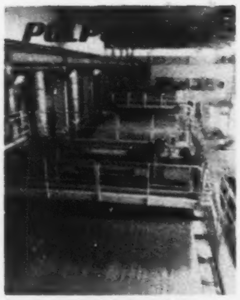

Cover: Fourdrinier section showing primary and secondary headboxes on Stone Container's new 400-tpd linerboard machine at Florence, S.C. (Photo by Scott Robertson, BE&K Inc.).

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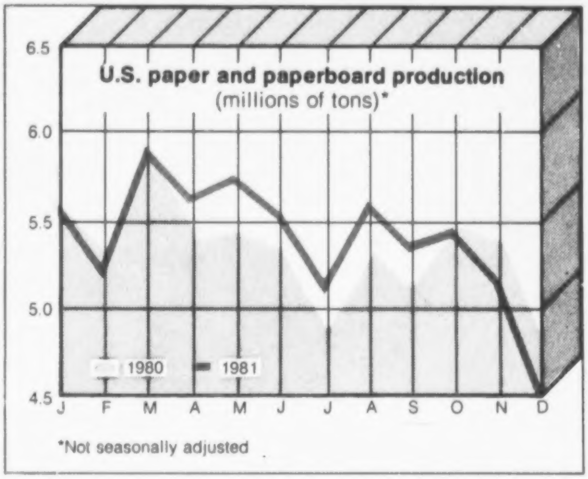
MONTH IN STATISTICS

U.S. paper and paperboard production fell off sharply in the final weeks of 1981, reaching only 4.4 million short tons in December, and bringing the seasonally adjusted annual rate for the month to about 5.5% below its November level, according to the American Paper Institute. Mills extended their normal vacation downtime, and several mills shut down completely.

For the year, however, total production reached 64.6 million tons, 1.2% above 1980. Preliminary data for the early weeks of 1982 show paper production moving back to the levels held before year-end shutdowns.

Among major grades, only newsprint production showed any strength in December, rising 6% above year-earlier levels. Uncoated groundwood and free-sheet grades continued in their downward trend, and coated papers weakened. Paperboard production declines were steep, and for all major grades output was well below 1980 levels.

Total Canadian newsprint shipments in December came to 800,000 metric tons, up 8.8% over a year ago, according to the Canadian Pulp & Paper Assn. Mill operating rates were 96% vs 94% in 1980, bringing the year-to-date rate to 94%.



		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	December	395	5.9	5,239	12.1
Uncoated groundwood (s)	December	111	−10.5	1,440	−3.9
Coated paper (s)	December	383	−5.0	4,925	5.4
Uncoated free sheet (s)	December	553	−13.6	7,861	−1.5
Unbleached kraft packaging and industrial (s)	December	269	−11.5	3,881	−1.0
Tissue	December	350	0.9	4,485	2.5
Total paper	**December**	**2,276**	**−6.7**	**30,982**	**2.6**
Kraft linerboard, unbleached	December	908	−12.0	14,558	2.3
Semichemical medium	December	320	−11.1	4,717	−0.1
Bleached paperboard	December	269	−9.1	3,926	1.6
Recycled paperboard	December	472	−14.8	7,070	—
Total paperboard	**December**	**2,035**	**−12.0**	**31,338**	**1.2**
Total paper and paperboard*	**December**	**4,448**	**−8.2**	**64,463**	**1.2**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	November	4,409	−0.8	52,534	3.1
Market pulp production	November	538	−2.2	6,291	−4.0
Wastepaper consumption at paper/board mills	November	1,225	−0.8	15,694	4.5
Pulpwood consumption (cords)	December	6,459	−4.7	80,668	−0.5
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft^2)	December	17.600	−8.6	245.200†	1.6
Containerboard inventories at box plants	Dec. 1	2,600	41.6		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	November	732	10.7	8,396	−4.8
Imports of Canadian newsprint	November	620	10.9	6,960†	−2.4
U.S. paper exports (including products)	November	347	−17.6	4,690	−10.1
Exports of unbleached kraft linerboard	December	152	−6.7	1,824	−23.4
Exports of woodpulp	November	266	7.7	3,669	−3.5
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	December	800	8.8	8,917†	3.4
Operating rates	December	96%	94%	94%	94%
Inventories held by U.S. consumers	Dec. 31	1,502	37.8		
Woodpulp shipments (export only)	December	561	−5.4	6,591†	−8.4
Operating rates	December	89%	93%	87%	95%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn.
*Includes construction and wet machine grades. †Not annualized. ‡Not directly comparable to year ago because of coding change. (s) = shipments.

NEWS ROUNDUP

FINANCE

U.S. paper profits tumble in fourth quarter

As the recession's impact on the pulp and paper industry picked up momentum in the fourth quarter, U.S. pulp and paper companies saw earnings fall 11% below year-earlier levels on a 0.2% rise in sales, according to a PULP & PAPER survey of 21 companies. Fourth-quarter after-tax profit margins dropped to 5.2% from 5.9% in the fourth quarter of 1980.

Much harder hit, however, were seven more companies with large forest products holdings, which saw earnings fall 27% as sales declined 6%. Fourth-quarter earnings for the total paper/forest products industry were down 17%.

By comparison, profits for U.S. industry as a whole slid 6% for the quarter following a 14% year-to-year increase in the third quarter, a *Wall Street Journal* survey of 435 firms found.

IP profits down. International Paper Co. posted profits of $239.6 million for the fourth quarter, but the results include a $215-million gain from the sale of Canadian International Paper, and a $12.5-million writedown for phaseout of certain West Coast wood products operations. On an operating basis, IP's profits came to $37.1 million, down 52% from 1980's level.

"In the fourth-quarter," said IP chairman and CEO Edwin A. Gee, "the housing market and our wood products business continued to be severely depressed. In addition, the general decline in the economy had a significant impact on our paper and packaging businesses."

Results for most other integrated pulp and paper/forest products companies were similar. The prolonged depression in the housing market continued to gouge lumber and plywood markets, which, along with the fall-off in exports to recession-impacted Europe and Japan, dropped profits below year-ago levels for over half of the paper/forest products companies.

Helping to prop up earnings for several companies, however, were investment and energy tax credits for capital spending projects, which reduced the 1981 effective tax rate. In addition, Mead, Scott, Southwest Forest, Boise Cascade, and Potlatch took advantage of the Economic Recovery Tax Act of 1981 and sold unusable tax benefits, improving their earnings picture.

Paper, packaging weakening. Demand remained strong throughout the fourth quarter for coated free sheet and specialty grades and for tissue and sanitary papers. Softening was seen for lightweight coated and uncoated paper, however.

Several companies reported a slowdown in demand for kraft and recycled packaging and converted products, intensifying the cost/price squeeze which began building in the previous quarter. And the fall-off in linerboard and hardwood pulp demand, which began about mid-year, continued into the quarter, contributing to occasional downtime and pricing weakness.

Outlook gloomy. The near-term outlook is simply not good, as most companies see no improvement in general business conditions until at least the second quarter, and probably later. Even with an upturn predicted by the second half, companies are remaining cautious for the entire year. "The first quarter will be horrible," says Champion International's chairman and CEO Andrew C. Sigler, adding, however, that the company is "just going to tough this thing out."

Canadian profits tumble. Canadian paper company profits continued to be hurt by the depressed housing market, according to preliminary reports. British Columbia Forest Products reported a loss of C$1.2 million in the quarter, citing poor market conditions in its logging/wood products operations.

Consolidated-Bathurst, reporting earnings down 34% below end-1980, said an extraordinary credit from sale of its investment in Abitibi-Price was partly offset by writeoffs from its investment in Forges HPC Ltée. and for provisions for eventual shutdowns of pulp/paper facilities replaced by capital improvements. Domtar, whose profits tumbled 54% from a year ago, said while the housing market took its toll, profit margins were somewhat improved for newsprint and groundwood specialties.

U.S. PAPER/FOREST PRODUCTS RESULTS

	Full year ($000)			
Paper companies	**Sales**	**Change 1981/80**	**Earnings[1]**	**Change 1981/80**
Chesapeake	$282,596	9.6%	$26,230	11.9%
Consolidated	536,899	5.2	54,663	4.0
Crown Zellerbach	3,148,300	2.7	75,300	−22.7
Federal Paper	520,347	9.3	31,044	6.6
Fort Howard	471,261	18.6	83,050	20.9
GN Nekoosa	1,493,000	8.7	95,000	−3.7
Hammermill	1,399,694	13.9	46,638	14.2
Int'l. Paper	4,983,400	−1.2	265,500	−12.5
Kimberly-Clark	2,885,700	11.0	204,700	12.6
Longview (10/31)	389,450	8.8	11,261	750.5
Mead	2,899,722	7.1	106,874	−16.9
Pentair	223,982	6.2	8,153	−33.7
St. Regis	2,880,183	3.5	179,218	1.0
Scott	2,309,444	10.9[2]	133,340	32.1[2]
Sonoco	533,349	8.8	38,491	18.4
SW Forest	779,461	5.6	16,102	−50.1
Union Camp	1,665,888	5.8	168,948	2.3
Westvaco	1,550,529	10.0	100,791	16.0
Willamette	975,640	3.8	28,604	−51.4
Total	**29,928,818**	**6.0**	**1,567,033**	**−7.4**
Forest products				
Boise Cascade	3,107,360	2.9	120,080	−11.3
Champion Int'l.	4,004,027	6.7	119,646	−34.4
Georgia-Pacific	5,414,000	7.9[2]	160,000	−34.2[2]
Louis.-Pacific	1,023,050	−14.4	26,280	−56.2
Pope & Talbot	236,117	10.7	2,711	−75.6
Potlatch	880,493	7.6	57,804	18.6
Weyerhaeuser	4,501,512	−0.8	234,444	−27.1
Total	**19,166,559**	**3.3**	**720,965**	**−28.1**
U.S. total	**49,095,377**	**4.9**	**2,287,998**	**−15.1**

CANADIAN PAPER INDUSTRY RESULTS

B.C. Forest	C$814,900	−4.2	C$17,200	−71.6
Con-Bathurst	1,479,000	6.5	101,800	−16.8
CZ Canada	653,100	−1.3	17,100	−53.0
Domtar	1,760,000	6.7	59,400	−36.5[2]
Great Lakes	568,594	5.4	77,774	−4.4
Total	**5,275,594**	**3.6**	**273,274**	**−30.5**

1. Income after taxes, from continuing operations, excluding most significant nonrecurring items in both years. 2. 1980 figures restated by company.

Tissue: Production back up for 1981, but flat in 1982; operating rates are down

Statistics	**1980**	**1981**	**1982e**
Production, 000 tons[1]	4375	4500	4500
Capacity, 000 tons	4961	5035	5220
Utilization rates, %	88.2	89.4	86.2
Imports	4	7	5
Exports	60	60	55
Apparent U.S. consumption			
000 tons	4319	4447	4450
lb/capita	38.8	39.6	39.2
000 tons/$ billion real GNP	2.91	2.94	2.95

[1] API data on production

Grade structure: Tissue is composed of two major classes—sanitary and "other." Sanitary tissue includes facial tissue, paper napkins, bathroom tissue, toweling, and basestock for sanitary stock, wadding, and wipers. Other includes basestock for waxing, wrapping, and miscellaneous tissue. Sanitary tissue can be further divided into consumer and industrial grades. Typical basis weights for single-ply toilet tissue are 12 to 14 lb/3000 ft^2, and for single-ply towel, 32 to 39 lb/3000 ft^2.

Production/capacity: Tissue production in 1981 increased to 4.5 million tons, up 2.9% from total 1980 production of 4.37 million tons. In late 1981, several producers experienced downtime, including Procter & Gamble and Scott Paper. Total U.S. capacity for 1981 was 5.03 million tons, representing an operating rate of about 89%.

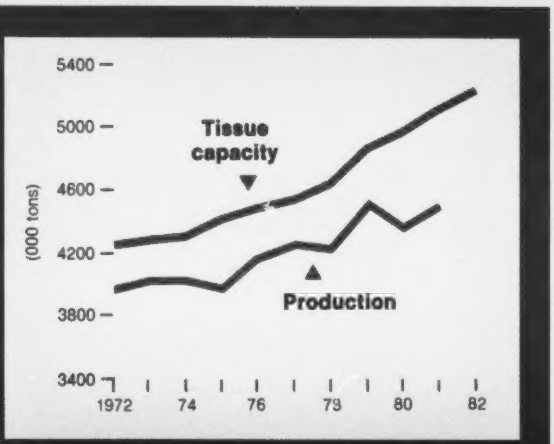
In 1981, net capacity increased only about 75,000 tpy due to the shutdown of several smaller machines. In 1982, capacity will jump 3.7% to 5.22 million tons. Wisconsin Tissue Mills will bring a new 60,000-tpy machine utilizing recycled fiber online in late 1982 or early 1983.

From 1970-81, production and capacity have grown at average annual rates of 1.9% and 2.2%, respectively.

Outlook: Most economic forecasts project the growth in real GNP to be basically flat in 1982. This will most likely result in 1982 tissue production being similar to last year, at around 4.5 million tons. Due to the growth in capacity, this will drop operating rates to about 86%.

Several new product developments have occurred recently, including the introduction of Kimberly-Clark's Softique facial tissue. There are two versions available; wet-formed on the West Coast, and a limited amount of the air-laid version in test market in upstate New York. Procter & Gamble's introduction of Summit, a lower-cost product, illustrates the increased competition in these grades. Consumers have been trading down to lower-price and -performance products.

In the high-cost, high-performance toilet tissue market, one producer has reportedly recently lowered the number of sheets/roll through the use of layering technology that produces a higher-bulk product.



Pricing: Prices of tissue basestock are generally not quoted, but wholesale price indexes of converted tissue product generally reflect trends of basic tissue grades: 1970, 115.1; 1972, 121.0; 1974, 155.7; 1975, 194.7; 1976, 214.7; 1977, 236.7; 1978, 253.3; 1979, 279.4; 1980, 343.4; 1981, 349.2.

Based on the producer price index, tissue prices in general advanced almost 23% in 1980, but in 1981 they advanced only 1.7%. Prices had been stable for almost 18 months until some producers increased them 7% in September 1981. Several unsuccessful attempts had previously been made to up prices.

Market: End uses for tissue papers are: 39%, toilet (52% single-ply and 48% multi-ply); 32%, towels; 8%, facial tissue; 11%, napkins; 5%, wipes; and 5%, nonsanitary.

Pulp mill soda ash consumption declining slowly

By BARRY SHOCKETT

The depressed U.S. economy has affected most sodium carbonate (Na_2CO_3) markets, but pulp mill usage has stayed relatively stable. Na_2CO_3 exports increased from 1978 to 1980, but domestic usage has been moving slowly downward.

When caustic soda supplies were tight in 1980, soda ash was substituted in some cases. If caustic supplies tighten noticeably, more substitution could occur, but the cost of dry bulk handling facilities required for this is a deterrent.

Foreign markets, like Europe, are the major growth areas for Na_2CO_3 demand.

In Canada, total sodium carbonate demand increased modestly in 1981, but its use in pulp mills dropped off slightly.

In 1978-79, most sulfite and NSSC pulp mills replaced Na_2CO_3 with caustic soda and the long-term prospect for soda ash is questionable.

U.S. production and consumption of sodium carbonate
(000 short tons)

	1978	1979	1980	1981e
Capacity	9620	10100	9620	10360
Production	8290	8253	8275	8350
Imports	8	40	18.3	11
Exports	779	997	1094	990
Apparent consumption*	7544	7306	7132	7254
Glass**	4170	3995	3851	3840
Chemicals	1720	1686	1426	1420
Pulping	260	252	250	250
Other	1394	1373	1605	1744

* Based on plant stocks adjustments as well as the traditional production plus imports minux exports "equation"
** Including container, sheet, and fibers

Canadian production and consumption of sodium carbonate
(000 short tons)

	1978	1979	1980	1981e
Capacity	451	441	441	441
Production	380.5	395	397	420.5
Total demand	569	558	557	564
Glass, including fibers	276	310	319.5	333
Chemicals	83.5	85	94.5	95
Pulping	92.5	51.5	29	27
Detergents, cleaners	25.5	26.5	27.5	28
Miscellaneous*	91.5	85	90.5	81
Imports	194	202	178	154
Exports	5.5	39	18	10.8

* Including mining, smelting, and water treatment

SODIUM CARBONATE

UNITED STATES

Uses: Primary pulp and paper industry use of Na_2CO_3 is in sulfite mills (for cooking liquor). Some kraft mills use soda ash for makeup liquor. The largest user is the glass industry, followed by chemical production, synthetic detergents, water treatment, and other uses.

Demand: U.S. pulp mill soda ash use in 1981 was an estimated 250,000 tons, the same as 1980, and represented 3% to 3.5% of total demand. Glassmakers, who used an estimated 3.8 million tons (53%), largely control the market.

Availability: Natural soda ash production capacity will increase later this year, when Tenneco's new one-million-ton plant goes onstream, insuring an adequate supply for the foreseeable future.

Sources: Most soda ash comes from natural deposits in Wyoming and California, with some synthetic product produced by the solvay process. The major producers include Allied, FMC, Kerr-McGee, Stauffer, and Texasgulf.

Pricing: Prices did not increase at the start of 1982 as they have in past years; no increase is foreseen in the first half of the year. Natural soda ash price is $92/ton for bulk shipments, f.o.b. Wyoming, and $106.25/ton, f.o.b. Trona, Calif., freight equalized with Wyoming shipping points. Synthetic product is listed at $132/ton, f.o.b. Syracuse, N.Y. Pricing history: natural, 1981, $86-$92/ton f.o.b. Wyoming; 1980, $76-$86/ton; 1979, $61-$66/ton; synthetic, 1981, $126-$132/ton; 1980, $113-$123/ton; 1979, $96-$101/ton.

Forecast: Domestic demand is expected to grow 1% to 1.5%/year. Pulp mill usage in 1982 is estimated at 257,000 tons. Exports should grow at least 10%/year.

CANADA

Uses: Sodium carbonate is used in sulfite mills for cooking liquor and in kraft mills to supplement the caustic in makeup liquor. Others include glass, chemicals, and mining.

Demand: Canadian pulp mill usage has dropped dramatically over the last few years to an estimated 27,000 tons in 1981. The glass industry used about 333,000 tons in 1981 (59%).

Sources: There is one domestic sodium carbonate producer in Canada, Allied Chemical, which is a solvay-process facility, and the remainder is imported.

Availability: Although domestic capacity cannot meet demand, imports make up the difference.

Pricing: Prices are not expected to change until the second or third quarter. Current price for bulk product, f.o.b. Amherstburg is $183/ton. Small-volume users are charged an extra $3/ton. Pricing history: 1981, $168-$183/ton; 1980, $145-$160/ton; 1979, $108-$128/ton.

Forecast: Sulfite pulp mill consumption will slightly decrease by 1985.

Mr. Shockett is consulting editor-chemical markets for PULP & PAPER.

PULP & PAPER

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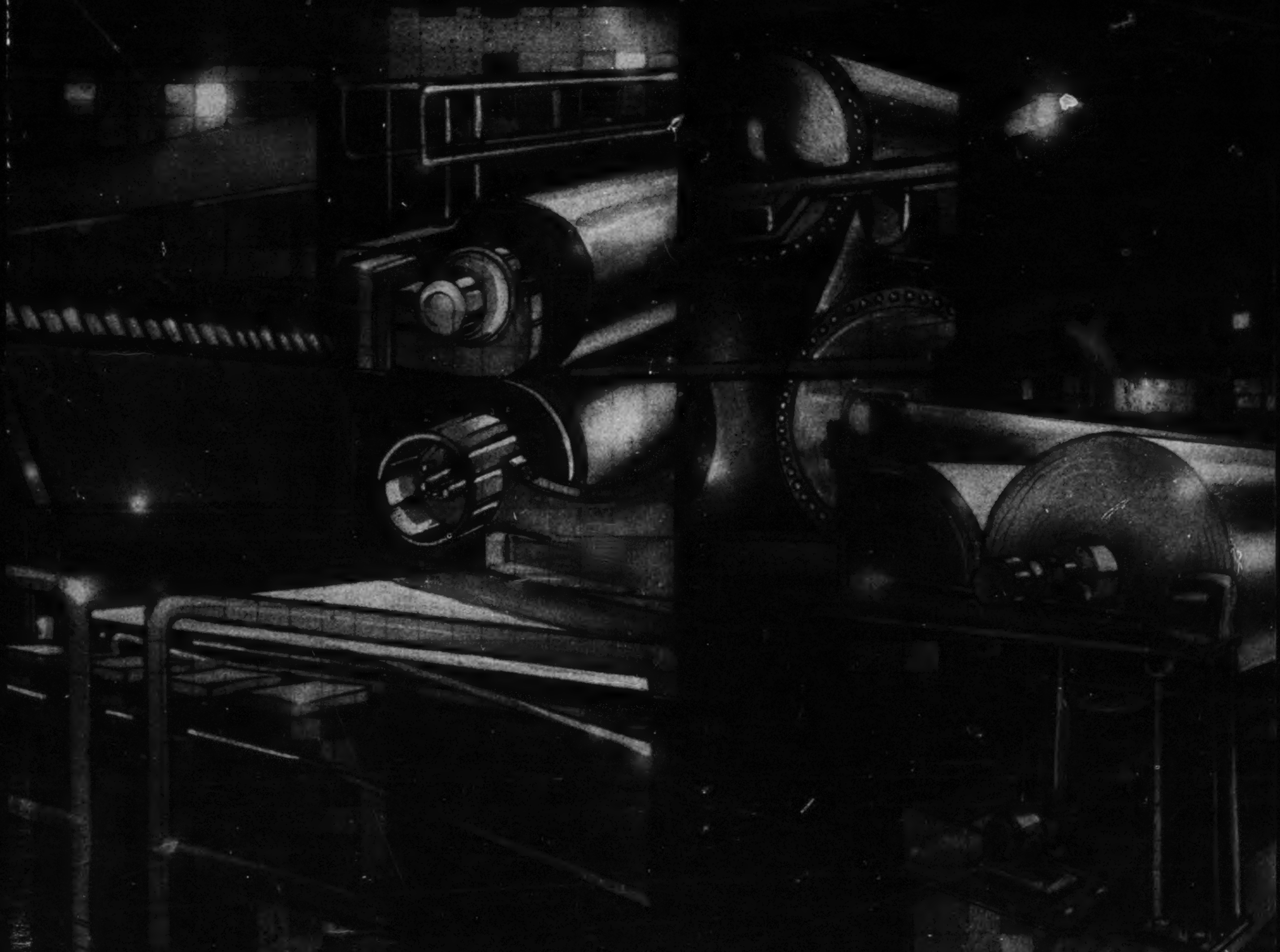

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Papermaking—
latest trends, technology

CCA's new woodwaste boiler
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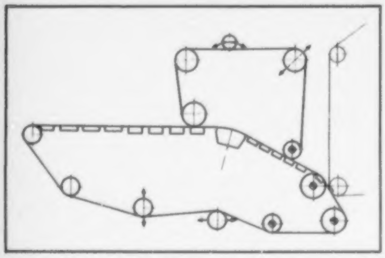

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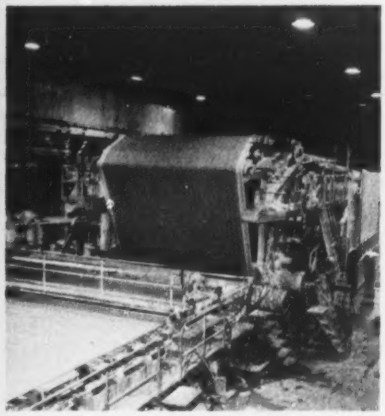

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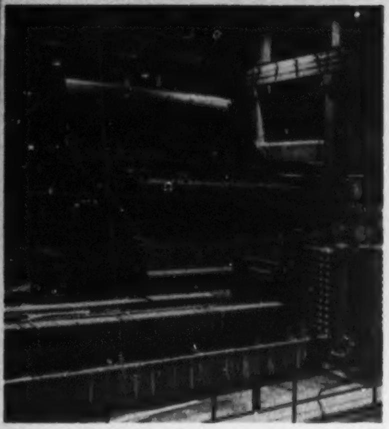
ABP BPA



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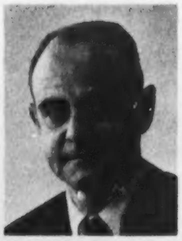

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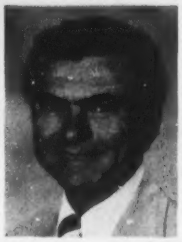

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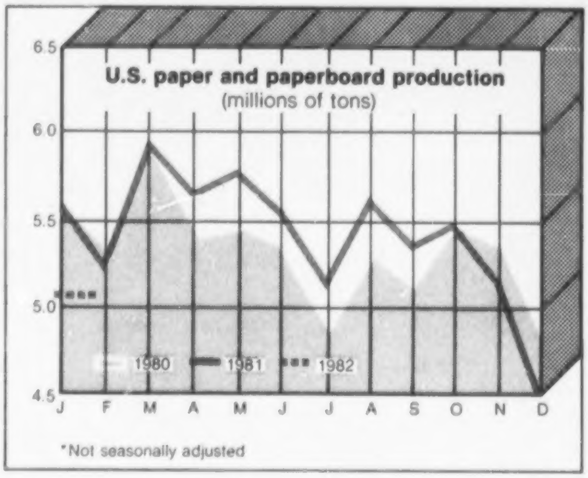
MONTH IN STATISTICS

U.S. paper and paperboard production leveled off somewhat in January, totaling about 5.1 million short tons in the month, 8% below year-earlier production levels, according to the American Paper Institute. Adjusted for seasonal and workday factors, the rate of production, measured by the December 1981-January 1982 average, was at 60.7 million tpy, only slightly below the November-December 1981 rate.

Among major grades, paper production in Janauary was close to November 1981 levels. With the exception of newsprint, tissue, and uncoated free-sheet paper, production of major paper grades was well below year-earlier levels. In paperboard, the largest impact fell on containerboard production for domestic use, particularly unbleached kraft linerboard. And the Fibre Box Assn. reported that shipments of fiber boxes in January were 10% below their January 1981 level. Production of containerboard for domestic use declined 13%.

Total Canadian newsprint shipments in January came to 671,000 metric tons, down 3.5% below a year ago, according to the Canadian Pulp & Paper Assn. Mill operating rates were 96%, matching year-earlier levels.



		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	January	441	5.8	5,282	5.7
Uncoated groundwood (s)	January	115	−10.2	1,378	−10.5
Coated paper (s)	January	385	−9.4	4,625	−9.4
Uncoated free sheet (s)	January	655	−0.8	7,864	−0.7
Unbleached kraft packaging and industrial (s)	January	300	−11.0	3,600	−11.0
Tissue	January	375	−0.5	4,500	−0.5
Total paper	**January**	**2,526**	**−3.0**	**30,316**	**−3.0**
Kraft linerboard, unbleached	January	1,077	−12.9	12,926	−12.9
Semichemical medium	January	375	−8.1	4,503	−8.0
Bleached paperboard	January	305	−10.8	3,655	−11.0
Recycled paperboard	January	545	−12.8	6,542	−12.8
Total paperboard	**January**	**2,400**	**−11.4**	**28,802**	**−11.4**
Total paper and paperboard*	**January**	**5,066**	**−7.9**	**60,787**	**−7.9**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	December	3,590	−6.8	51,985	2.5
Market pulp production	December	419	−13.3	6,190	−4.6
Wastepaper consumption at paper/board mills	December	1,108	−2.8	15,409	3.3
Pulpwood consumption (cords)	January	5,658	−9.2	n.a.	n.a.
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	January	18.961	−10.3	18.961†	−10.3
Containerboard inventories at box plants	Jan. 1	2,628	33.9		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	December	644	−7.5	8,341	−5.0
Imports of Canadian newsprint	December	557	−5.6	6,936†	−2.7
U.S. paper exports (including products)	December	338	−21.9	4,636	−11.1
Exports of unbleached kraft linerboard	January	1,077	−12.9	12,926	−12.9
Exports of woodpulp	December	315	−2.2	3,678	−3.4
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	January	671	−3.5	671†	−3.5
Operating rates	January	96%	96%	96%	96%
Inventories held by U.S. consumers	Jan. 31	1,539	32.0		
Woodpulp shipments (export only)	January	451	−16.9	451†	−16.9
Operating rates	January	90%	95%	90%	95%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn.
*Includes construction and wet machine grades. †Not annualized. ‡Not directly comparable to year ago because of coding change. (s) = shipments.

WOOD PRODUCTS

U.S. wood exports forecast to 1990

U.S. wood exports may increase 93% over the current decade to a possible $7.0 billion by 1990, John R. Forrest, senior vice president, Boise Cascade Corp., told the recent Forest Industries Advisory Council meeting in Boca Raton, Fla. "The stage is set for excellent long-term world wood markets with the U.S. assuming a larger role," he said.

FORREST

Already during the past decade, offshore shipments of logs, lumber, and plywood rose approximately 50%, reaching about 1.0 billion ft^3 in roundwood equivalent in 1980. Although logs are still the largest segment, there has been considerable growth in lumber and plywood exports, Forrest said. On a volume basis, exports of softwood and hardwood lumber have doubled, panel products have tripled, while logs exports increased 20%.

"As exporters, we are doing better than other manufacturing industries," he noted. "The U.S. share of world export markets for all manufactured goods declined from 19% during the last ten years. For the same period, the U.S. share of world wood imports increased from 13% to 18%."

Relative to production, lumber exports increased from about 3% in 1970 to 8% in 1980, while plywood moved from slightly over 1% to about 4%.

Future growth trends for wood exports from 1980 to 1990 were presented by Forrest based on projections developed by the National Forest Products Assn.

Shipments to Japan, currently the largest market for U.S. wood exports, are seen rising by more than 50% to $3.1 billion by 1990. While logs currently account for about two-thirds of shipments, exports of lumber, plywood and other manufactured products are expected to show the fastest growth if trade barriers can be eased. China, which bought $100 million in U.S. softwood logs in 1981, may lift U.S. wood products purchases to $600 million by 1990.

Projected U.S. exports of wood products, 1980-90
(millions of $)

By product	1980	1990	% change 1980/90
Softwood logs	1452	2013	38.6%
Softwood lumber	777	2070	166.4
Softwood plywood	95	445	368.4
Hardwood logs	129	265	105.4
Hardwood lumber	234	461	97.0
Hardwood veneer	106	222	109.4
Pulpwood & chips	387	540	39.5
All other	472	1025	117.2
Total	3652	7041	92.8
By destination			
Japan	2013	3120	54.9%
China	51	620	1115.7
Australia	47	110	134.0
Europe (EC)	725	1566	116.0
Middle East	72	265	268.1
Latin America	134	330	146.3
Canada	337	510	51.3
All other	273	520	90.5
Total	3652	7041	92.8

Source: National Forest Products Assn.

The U.S. currently is only the tenth-largest lumber supplier to the U.K. and accounts for only about 4% of lumber imports by the rest of Europe. Exports of all U.S. wood products to the EC are projected to more than double over the decade to nearly $1.6 billion by 1990, according to Forrest.

Huber plans new waferboard plant

J.M. Huber Corp. has begun design work for a $30-million waferboard plant in Easton, Maine. The 240-tpd plant will be the first to produce structural board on a caulless forming line, according to the company. The site of the plant is an old sugar beet refinery at Easton, which Huber is revitalizing to use as much of the existing facility as possible. NGM International has been retained to provide design, project management, construction management, and startup assistance.

Resources for the plant will come from Huber's Maine timber holdings as well as other purchased wood from the area. Excess woodwaste will generate steam for resale.

Maclaren buys wood products mills

James Maclaren Co. Ltd. bought 50% of Industries Maniwaki Ltd. and the option to acquire the remaining 50% within five years, and also purchased the 50% of Sogefor Ltd. that it did not already own. Sogefor, previously partly owned by the Quebec government's Société Générale de Financement du Québec, runs a particleboard mill at Lac des Iles, Que., while Maniwaki has a sawmill, veneer mill and parquet flooring mill in Maniwaki, Que.

- **Chesapeake Corp. of Virginia** has purchased a one-year-old hardwood sawmill near its West Point, Va., pulp and paper mill owned by West Point Log Co. Inc. The mill, which has a capacity of 8 million bd ft/year of lumber, will be started up when lumber market conditions improve.
- Sharon Steel Corp. has reached a tentative agreement with **Evans Products Co.** to acquire the 57% of Evans it doesn't already own in a share exchange with an indicated value of $150 million. Sharon is 86%-owned by **NVF Co.**, a maker of vulcanized fiber and plastic products, which in turn is controlled by Miami financier Victor Posner. The deal is expected to close in two months.

Although emphasizing its retail and transportation activities in recent years, Evans still owns about eight lumber, plywood and hardboard mills in British Columbia and the Pacific Northwest.

- **Masonite Corp.**, which has been the subject of takeover speculation, has a new major shareholder. The Pritzker family of Chicago recently aquired 10% interest in the timber and building products company, but a family member described the purchase as "strictly an investment."

Uncoated printing/writing papers: Markets weak, but modest pickup still possible in second half

Statistics	1980	1981	1982e
Production, 000 tons[1]	7983	7861	7850
Capacity, 000 tons	8645	8791	9017
Utilization rate, %	92.3	89.4	87.1
Imports, 000 tons	116	112	100
Exports, 000 tons	88	120	120
Apparent U.S. consumption			
000 tons	8011	7853	7830
lb/capita	72.0	69.9	70.0
000 tons/$billion real GNP	5.41	5.21	5.17

[1] API data for shipments

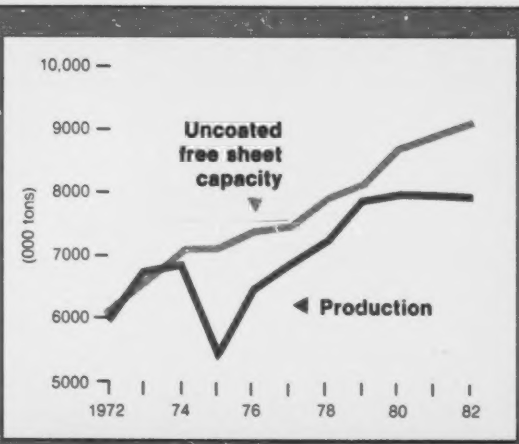
Grade structure: Uncoated printing/writing papers include uncoated free-sheet grades with 10% or less mechanical pulp in the furnish. The two major subcategories are uncoated book and the printing and writing grades, with major end-uses including offset, bond, forms bond, reprographic, tablet, envelope, cover and text. Uncoated groundwood, bristols and thin papers are not considered part of this group.

Production/capacity: Production dropped by more than 1.5% in 1981 from the record pace of the previous year as most of the largest uncoated free-sheet grades—offset, bond and envelope—saw demand decline. This slide was only partially offset by healthy growth in forms bond demand. With capacity up by only about 1.7%, operating rates fell below 90%, hitting 89.4% for the year and about 85% for the fourth quarter.

After a 146,000-tpy capacity increase in 1981, capacity will rise by another 226,000 tpy in 1982, representing a 2.6% rise after the 1.7% increase of 1981. The boost for 1982 is close to the 2.7%/year growth forecast by American Paper Institute for the period through 1984, but it contrasts with a 3.5%/year average for the 1970s.

Outlook: Demand for major grades of uncoated free-sheet worsened through much of 1981 as consumers slashed inventories, and operating rates were still deteriorating going into early 1982. The inventory correction was expected to end during the second quarter and demand should begin to pick up by the fall, with cut-size sheets and forms bond leading a very modest recovery for the industry. Offset grades still suffer from competition by uncoated groundwood and coated paper, and the important book market is not expected to recover strongly this year from its current problems.

Pricing: Most mills raised prices by about 6% starting in June, but subsequent discounting eroded most of that jump—and in some cases, transaction price levels actually ended 1981 below where they had been at the start of the year, with list prices only 8% higher than December 1980 levels. With operating rates expected to average lower through 1982 than in 1981, price increases will be hard to push through and a successful hike is unlikely before the fall.



Estimated capacities of major U.S. companies are:

	Annual capacity (000 tons)	Capacity share (%)
1. Boise Cascade Corp.	850	9.4
2. Champion International	762	8.4
3. International Paper Co.	675	7.5
4. Great Northern Nekoosa	670	7.4
5. Hammermill Paper Co.	595	6.6
6. Mead Corp.	473	5.2
7. Union Camp Corp.	470	5.2
8. Georgia-Pacific Corp.	464	5.1
9. Weyerhaeuser Co.	445	4.9
10. P. H. Glatfelter Co.	430	4.8
11. Simpson Paper Co.	340	3.8
12. Pentair Inc.	190	2.1
13. Westvaco Corp.	173	1.9
14. Scott Paper Co.	160	1.8
15. Fraser Paper Ltd.	150	1.7

U.S. annual capacity (1982): **9.017 million tons**
Capacity share of top five companies: 39.4%
Capacity share of top ten companies: 64.7%

Because the category includes so many grades, two important grades have been chosen to track price trends (year-end, $/short ton): Book paper, No. 3 offset, 45-lb, sheets—1972, $460; 1974, $535; 1976, $506; 1978, $645; 1979, $711-$717; 1980, $813; 1981, $878. Forms bond, 15-lb, rolls—1972 not available; 1974, $470; 1976, $519-$520; 1978, $538-$550; 1979, $620; 1980, $697; 1981, $753.

Markets: Estimated shipments by end-uses are: bond, mimeo, duplicating, xerographic—24%; forms bond—20%; offset printing—24%; envelope—11%; tablet—4%; other—17%.

Future of sulfite pulping is tied to integrated mills, market pulp

Existing, environmentally adapted sulfite pulp mills should survive into the foreseeable future, but with limited growth—mainly in Europe, U.S.S.R.

By H.L. HERGERT

☐ Bleached kraft pulp manufacture in the U.S. and Canada has expanded rapidly during the past two decades. This has created the impression among many papermakers that sulfite pulp is a dead issue. However, the fact is often overlooked that more than five million tons of installed sulfite pulp capacity still exists in these two countries. This tonnage represents an important resource to the papermaker and should raise important questions about its future.

To reasonably assess the future of sulfite pulp, it is necessary to understand why sulfite production has been more or less static for the last 30 years, while kraft pulp production has substantially increased. It is equally important to examine recent technical developments (that is, two-stage cooking, ultra-high-yield sulfite, neutral sulfite with anthraquinone) to determine whether new technology can preserve the sulfite process or even reverse the trend, compared with kraft.

Prior to World War II

Prior to World War II, sulfite pulp was the normal component of most commodity papers such as newsprint, coated book papers, and writing papers. Long-fibered, "white" softwoods (spruce, hemlock, true firs) were used almost exclusively. Cooking was done with calcium base, and spent cooking liquor was discharged into the nearest water course. Brightening of pulp was readily accomplished by simple bleaching agents, such as hypochlorite. Fiber strength was not critical because printing machines operated at modest speeds.

Post-Depression industrial expansion, population increases, and massive increases in shipments of goods overseas spawned the modern packaging industry. Linerboard and sack paper required good tear strength, which could be best provided by thick-walled pulp fibers derived from pine or Douglas fir. Neither of these types of wood could be readily pulped by the sulfite process. The kraft process was chosen on two counts: it accommodated these favored wood species, and it preserved the fiber's inherent tear strength. This "marriage" of favorable circumstances was further aided by the rapid advancement in kraft recovery boiler technology and by geography. Those parts of the country which happened to have remaining large stands of pulpwood (that is, the Southeast and Northwest) were mainly stocked with types of wood ideally suited for kraft pulping, which could not be used in the calcium-base sulfite process.

Sulfite pulping in the 1950s

Following World War II, and particularly during the 1950s, all types of industrial activity virtually exploded in Europe and Asia, as well as North America. This was accompanied by intense pressure for expansion of printing and business papers.

Existing sulfite mills were having to go farther and farther for a source of wood supply. The sulfite mills of Wisconsin, for example, had to get at least part of their spruce requirements from as far away as Montana or northern Ontario. At the same time, kraft mills in the South and the Northwest did not usually have to go more than 50 to 100 miles for their wood.

Rather cumbersome bleaching sequences were still required to brighten kraft pulp in the early 1950s; even then, whiteness did not come close to fully bleached sulfite pulp. Unfortunately for the sulfite process, invention of a practical means for chlorine dioxide bleaching in the mid-50s virtually eliminated this last barrier to the penetration of kraft mills into all aspects of paper production.

The final significant event was the belated discovery of the need for full integration in the forest products industry. Coniferous trees were becoming much too valuable to be indiscriminately used for pulpwood. The residues from sawn lumber and cull logs (not otherwise suitable for lumber production) became, as a matter of economic necessity, the most practical source of raw material for chemical pulp production. Chips from integrated operations could be most effectively pulped by the

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kraft process. Also, the rapidly escalating value of softwood timber forced paper companies to closely examine hardwood resources. Effective use of hardwoods for paper, at least initially, required preservation of strength properties even more so than with softwoods. Neutral or alkaline pulping methods were clearly necessary for adequate burst and tear strength.

While sulfite pulp had long held the reputation for easier beating than kraft pulp, advancement in refining techniques in the 1950s not only permitted ready substitution of kraft for sulfite, but allowed retention of its superior tear properties.

From 1950s to present

All of these factors clearly show up in the statistics for kraft and sulfite pulp production over the last 30 years (see Table 1). Total bleached kraft paper production has increased 850%, while total sulfite has remained flat (1980 compared with 1950; actually, a case could be made for declining production if the peak of the mid-1960s is taken as a base). Most bleached pulp production goes into integrated paper operations. However, when examining that segment of pulp production going to market, the contrast appears even greater. Kraft market pulp has increased 1700% during this period, while bleached sulfite has declined 33%.

Before concluding too much from these production figures, the surviving sulfite pulp industry should be more closely examined. In 1980 (the last full year for which data are readily available), total U.S. sulfite pulp production was essentially equivalent to capacity, about 2.5 million tpy (see Table 2). About one third of this production was high-alpha (dissolving) pulp, and one half was produced for integrated operation. Most of the large sulfite market pulp mills made dissolving pulp as a primary product. Lesser quantities of specialty sulfite papermaking pulps were made in the same mills, the ratio of papermaking to dissolving pulp production being varied each year according to market conditions. At present, there are nine major sulfite pulp mills in the U.S. serving the market, and 15 which produce pulp only for integrated operations.

If the view is extended to Canada, a somewhat similar picture is seen. There are 35 sulfite pulp mills currently operating in Canada at a rate of 3 million tpy. Of these, nine sell about 785,000 tpy to the market. Most Canadian sulfite pulp is produced in relatively small mills and is blended with mechanical pulp for newsprint production.

Combined U.S. and Canadian sulfite production capacity is shown in Table 3. Total capacity figures in this table are believed to be reliable, but the split between market and integrated production, as well as between bleached paper pulp and dissolving pulp, is, as previously noted, a function of market conditions.

World sulfite pulp mill capacity is estimated to be close to 17 million tpy. Of this, almost one fourth is used in nonpaper products. The sulfite process continues to remain much more popular in western and eastern Europe than in Japan and North America.

Current strengths, weaknesses

Past expansion of sulfite paper pulp production has been inhibited by wood limitations, as previously noted. Many sulfite mills were small by today's standards and

[illegible]

[illegible]

[illegible]

[illegible]

could not justify investment in secondary treatment and recovery boilers to meet environmental goals mandated by the government in the 1970s. Recovery-system technology had been late in developing.

On the other hand, softwood sulfite pulps have the following desirable characteristics: high brightness (typically five to six points better than kraft), softness, easy refining, good paper formation, smooth paper surface, minimal print picking, and low speck count. Because of these "advantages," sulfite continues to be used and even preferred in several papermaking applications, most of which may be described as "specialties."

Two major specialty applications for sulfite pulps are photo print papers (where high stable brightness, excellent formation, and special surfaces are required), and specialty papers for high-quality printing, writing, and display purposes. These specialty papers (for example, creped tissue, which benefits from the softness of sulfite fibers, and greaseproof, glassine, and facsimile, matrix, and decor papers) are usually made by small mills to achieve characteristics distinct from those offered by high-volume producers. Sulfite finds a place here because of various specific characteristics. For newsprint, the chemical pulp portion (about 25%) continues largely to be sulfite, because the relatively high brightness of unbleached sulfite makes bleaching unnecessary.

Trend to soluble bases

Existing U.S. sulfite pulp mills will likely remain in production for a variety of reasons. First, U.S. mills and at least part of those in Canada, have now made an investment in environmental compliance. Although expensive, the total cost of recovery and secondary treatment, added to a well-maintained but partially depreciated pulp mill, should certainly produce substantially lower fixed costs than a new kraft pulp mill with capital cost in excess of $500,000/daily ton. Modern market sulfite mills have the benefit of as much up-to-date technology as a new bleached kraft pulp mill.

Most mills use one of three soluble bases: sodium, ammonia, or magnesium. Originally, all sulfite mills used calcium-base liquor prepared from the reaction of sulfur dioxide with limestone. Cooking was slow to allow penetration of the base into woodchips. A truly effective method for disposal of calcium base spent cooking liquor has not been found to date. The liquor is sometimes evaporated and burned (usually in a mixture with oil to maintain combustion) in a Loddby-type furnace. The base ends up as a gypsum slag or ash which cannot be reused. Sulfur dioxide generated during combustion must be reacted with the base in a scrubber. Only a few sulfite mills which practice recovery use calcium base.

Each of the soluble bases has a particular merit favorable to its use at a particular site. These merits are summarized in Table 4. For those mills manufacturing pulp for integrated paper operations, magnesium base is usually the choice. In this case, magnefite cooking (bisulfite cooking with very low free sulfur dioxide) gives a stronger fiber than conventional acid bisulfite cooking.

Mills manufacturing both dissolving pulp and specialty sulfite pulps generally prefer an ammonia base because of the simplicity of the recovery cycle and the bright, clean pulp that can be produced. A soda base permits combustion of soda-laden bleach plant effluent, either from an oxygen-alkali bleach stage or pressurized hot caustic extraction (dissolving pulp), as well as spent liquor from cooking.

Another alternative is two-stage cooking, practiced in Sweden and Finland, which requires sodium because of the volume of base which must be recycled. Normally, soda-base sulfite uses a reducing furnace similar to a kraft boiler. The sulfide smelt must be selectively oxidized back to the sulfite state, a somewhat complicated and energy-intensive process. For this reason, only a few conversions to the soda-base system have been made during the past decade.

Growing energy efficiency

A second favorable aspect for sulfite mills is energy efficiency. Modern sulfite recovery systems do not require recausticization, an excessively energy-intensive operation in the kraft process. The amount of base used in cooking is lower than with kraft, thus the "dead" load of inorganics carried around the recovery cycle is lower. Because of the lower lignin content in sulfite unbleached pulp, bleach chemical consumption is as much as one-third lower than comparable kraft pulp. While this is not an energy item directly at the mill, it represents lower energy consumption for sulfite on an absolute basis.

There is no inherent barrier to having a sulfite mill with labor efficiency as high as a modern kraft mill. The PWA Waldhof mill in Mannheim (West Germany) and the new Rosenthal mill in East Germany are examples. Both mills have Kamyr continuous digesters which facilitate spent liquor collection, sulfur dioxide recycling, product uniformity, and labor reduction. Kamyr, or modern pressure washers in the bleach plant, and computer process control also facilitate labor efficiency.

Outlook for markets

Modern sulfite mills produce pulp for end uses which have a reasonably good future. Many produce dissolving pulp as well as specialty paper pulps. While some cellulose-base fibers and films have shown a decline in Europe and the U.S. during the last decade (for example, cellophane, filament rayon, and regular rayon staple), the surviving segments of this industry appear to be well situated with regard to petrochemical base competitive materials. Some fiber and plastics producers in this area even forecast substantial growth potential later in this decade. Cellulose base chemicals, such as CMC (carboxymethyl cellulose) and methyl cellulose, continue to show growth. Furthermore, rayon and acetate production continue to expand in other parts of the world.

All of this means that the sulfite pulp producer who manufactures both dissolving and papermaking specialties expects to continue in this mode for the foreseeable future. It goes without saying that other types of papers, such as fine papers, book, and coated, currently using some sulfite also have a good outlook.

Finally, many market sulfite pulp mills have roll-finishing capability. This means that they are able to serve the "fluffing" market. Roll pulps are needed for most machines which produce diaper pads, hospital goods, and sanitary napkins. Sulfite pulp produced in a low-density sheet can be readily fluffed without undesirable neps (nits). Bulking and absorbency can be very good, provided the sulfite mills lower resin in the pulp and provide drying controls to deliver a product with uniform moisture content, sheet thickness, and softness. These same characteristics are needed in the raw material for the newly emerging dry-formed process. If, and when, dry forming becomes a significant factor in paper manufacture, favorable "fluffing" characteristics of sulfite pulp could become even more important than better inherent individual fiber strength characteristics of kraft pulp.

Significant developments

North American pulp and paper technologists showed considerable interest in the keynote speech of Lennart Stockman at the 1978 International Sulfite Conference. Stockman pointed out that, contrary to popular opinion, sulfite can be regarded as equal to kraft in properties such as runability, printability, and Z-direction strength.

(Continued on next page)

He concluded that the environmental position of a sulfite paper-pulp mill has been reversed compared with that of a kraft mill. Even overall energy consumption could effectively compete with mechanical pulp processes. In spite of Stockman's assertions, the question remains as to whether the sulfite process is at a turning point.

Several important technical advancements have taken place in the last few years that could have a significant impact on the future. Among the most recent of these, "neutral" sulfite/anthraquinone seems to be particularly noteworthy. A recent report of mill trials carried out in Finland by Rauma-Repola Oy and United Paper Mills Ltd. gave fully bleached pulps from pine and spruce with papermaking properties equal to kraft in all properties except tear. The bleached pulps were obtained at much higher yields, however.

High-yield, neutral sulfite-AQ pulps obtained in a yield range of 60% to 75% were reported to have similar linerboard properties compared with kraft obtained in a yield range of 52% to 55%. The cooking liquor in this process uses a mixture of sodium sulfite and sodium carbonate, thus it is not actually neutral. Anthraquinone is added to reduce the amount of cooking chemicals needed for effective delignification.

According to a recent report, the excellent properties of neutral sulfite/AQ pulp have encouraged United Paper Mills to embark on a modification program at its specialty paper mill in Tervasaari, Finland. UPM expects to initially produce 75,000 tpy of this pulp for integrated operation. Depending upon the project's success, further conversions to this process might be forthcoming. The driving force would be the yield improvement, particularly in Nordic countries which have very high wood costs and limited future potential for forest growth expansion.

Another development, recently updated, is multiple-stage cooking. Domsjo has reported improvements based on the two-stage Stora process. In this process, wood is first treated with hot sodium sulfite and then cooked with acid sodium bisulfite. The improvements consist of a method of mechanical deresinification and computer optimization of the cooking stages. Rauma has separately pioneered a three-stage process: sodium bisulfite, followed by acid bisulfite, and, finally, sodium carbonate. The Rauma recovery scheme, upgraded in the mid-1970s, is said to be no more complicated than the kraft system, and is able to avoid the energy-intensive recausticization stage of the latter.

The most recent sulfite developments can be loosely lumped into the category of ultra-high-yield sulfite. These developments involve a combination of very mild sulfite cooking with mechanical refining, and are primarily directed toward newsprint. Although overall yield from wood is somewhat less than TMP or conventional groundwood, the sulfite stage permits a major reduction in electrical consumption at the refiner. Major process development in this area has been made by CIP Inc. and Consolidated-Bathurst. Major R&D is currently in progress at the Pulp & Paper Institute of Canada.

In the meantime, some small sulfite mills in Canada have not yet made an investment in recovery facilities. Perhaps the most important thing that could happen to them is finding new uses for spent sulfite liquor. One major U.S. West Coast sulfite mill set a strategy for profitable spent liquor disposal by investing in R&D and marketing a spectrum of liquor-derived products ranging from oil-well-drilling mud additives to adhesives. The mill was aided in this task by the availability of an alcohol fermentation plant which permitted production of lignosufonates with low sugar content (spent sulfite liquor from conventional acid bisulfite pulping contains about 75% lignosulfonate and 25% wood-derived sugars).

Among the most recent proposals for spent liquor utilization are: adhesives for chipboard, molasses substitute in animal feeding, road binder, dispersant in cement manufacture, drilling-mud formulations, and formation fillers or dispersants in secondary oil recovery. The problem with all of these developments is that they usually require substantial capital for separation or upgrading procedures, along with innovative development and marketing efforts. While small sulfite mills are unlikely to generate the cash flow needed to support this type of activity, there is increasing evidence that a number of major companies and mills are directing their efforts in this area. The increased price of ethyl alcohol, particularly for use in motor fuel, has stimulated reexamination of spent liquor as a raw material. A considerable number of such plants have been built in Europe and the U.S.S.R., but only one is in operation in the U.S. Currently, the major inhibitor to such expansion of alcohol production is uncertainty about U.S. federal and state tax incentives.

Future prospects

Most forecasts of world pulp demand suggest growth will continue at historic rates. Since capital and manufacturing costs are likely to increase faster than the general rate of inflation, investment in new pulping capacity is likely to lag demand. Consequently, medium-term pulp shortages should guarantee survival of those sulfite mills which can meet local environmental requirements.

On the other hand, the psychological impact of strong progress in the kraft industry is likely to ensure that no new market sulfite mills will be built in North America or Japan. Added to this is the fact that most new pulping capacity in the U.S. will be added in the Southeast, which does not have much wood suitable for sulfite pulping. Much of Europe has a different orientation. Preference for sulfite pulp is related to continued wood availability and aversion to the odor generated by a kraft mill. For this reason, at least four or five major sulfite pulp mills are expected to be built in Central Europe and the U.S.S.R. during the next few years.

Commodity paper-pulps require a threshold volume of use to maintain a market. This volume is already present in the case of conventional bleached sulfite pulp, which is another main reason why the existing industry will probably continue to survive, especially if the total pulp market tightens up in the near future. Most likely, there will be no significant number of new market mills based on the new sulfite technology mentioned previously, primarily because each of the various process modifications yields a product somewhat different from what is now available in the market. On the other hand, many of these new sulfite modifications give pulp which is eminently suitable for a wide variety of papers. For this reason, it appears probable that some of the new processes will be applied to integrated operations. This would be particularly true of the ultra-high-yield sulfite process which holds some promise of being the next generation of papermaking beyond the current TMP vogue. ☐

Canadian industry faces off year but U.S., Europe should do better

U.S. will buy less Canadian pulp than in 1981, and labor settlements threaten Canada's competitiveness, CPPA annual meeting told

By DAVID R. ALLAN, News Editor

☐ Canada's newsprint mills have lost some market share in the U.S. and those problems, plus anticipated reductions in U.S. imports of pulp this year, will push overall Canadian pulp, paper and board shipments down 1% in 1982, according to Canadian Pulp & Paper Assn. forecasts presented to the recent CPPA annual meeting in Montreal, Que. But U.S. and European industry officials told the gathering that their industries may ship about 1% more goods this year than in 1981.

Canadian mills have more to worry about in the long run than a one-year dip in production levels, however. CPPA president **Howard Hart** warned the meeting about a pair of dangers that threaten that country's long-term prospects in a decade that, he said, should see world pulp and paper consumption increase by 70 million metric tons.

The first danger Hart warned against is "overconfidence in our ability to prosper simply because we have such abundant natural resources." He cited the need for more intensive forest management, and noted that "dedication to industrial innovation has so far been unaccompanied by tax incentives which are in any way adequate to stimulate large increases in research and development."

Overblown nationalism

While Canada faces the new decade with confidence in its ability to compete in the world pulp and paper industry, Hart stated that it is also in danger of hampering itself by a kind of "overblown nationalism which can alienate our friends and lead us down a blind alley of increasing mistrust and bitterness, particularly in the U.S."

Hart noted that the Foreign Investment Review Act has imposed conditions on foreign-owned companies that "might easily be regarded as a form of economic extortion affecting their non-Canadian operations" and he hailed the U.S. move to take the issue to the General Agreement on Trade and Tariffs for resolution.

Hart also attacked Premier Trudeau's controversial National Energy Program as "the most prominent contributor to a higher level of tension in Canada/U.S. affairs."

Pointing to both the FIRA and NEP, Hart said than when, for political rather than economic reasons, "a U.S. publisher decides that, all things considered, he would rather buy his newsprint domestically," then "Canada is the loser."

Turning to the short-term prospects facing Canada, Hart predicted that, even if the economy turns around by midyear, Canadian pulp and paper shipments will be off by about 1% from 1981 levels. Duplicating that caution, CPPA pulp section manager **Brian McClay** told the meeting that U.S. demand for Canadian market pulp could fall by 5% in 1982, and that he expects less-developed countries will also cut their imports of Canadian pulp this year.

Quick turnaround possible

At the same time, however, Western Europe and Japan should modestly increase their purchases of Canadi-

Table 1. **Canadian pulp and paper shipments**
(000 metric tons)

Grade	**1980**	**1981***	**1982e**
Newsprint	8620	8860	8225
Printing/writing and sanitary	1895	1820	1975
Packaging papers and boards	2935	2900	2975
Pulp exports	7200	6600	6850
Total	20,650	20,200	20,025
By destination			
Domestic	4300	4430	4575
Export	16,350	15,770	15,450

*Shipments in 1981 affected by strikes which idled 900,000 metric tons capacity during the year.
e = estimate
Source: Canadian Pulp & Paper Assn.

an pulp. Thus, overall Canadian exports of pulp will drop by just 2%. And with producer inventories "still only equal to just over one month's supply," McClay noted, "it should be clear that when paper and board production does recover, the demand and supply of market pulp could be very rapidly in balance."

President of the American Paper Institute **Louis Laun** was less specific in his forecasts for the U.S. industry, but he did tell the CPPA meeting that "with growth in business activity of 1% in 1982 and 5% in 1983, the demand for paper and paperboard will grow at about the same rate."

The U.S. Gross National Product assumption his forecast is tied to is more optimistic than CPPA estimates, however: CPPA expects the U.S. GNP to remain flat this year, while Wood Gundy Ltd. chief economist **Dr. John Grant** told the meeting he expects the Canadian GNP to fall by 0.8% in 1982.

European political uncertainty

Europe's economy won't be performing much better than the North American economies, according to **Albert de Monts** of the European Confederation of Pulp, Paper & Board Industries. De Monts forecast European Community economic growth of 1% to 2%—with the outlook clouded by political and monetary uncertainty.

European paper and board production will roughly match that increase, coming after a year in which production actually fell by 1% to slightly below 24 million metric tons.

Only West Germany and Finland showed significant gains in production, while France and Italy were level, and the U.K. and Sweden saw "distinctly less" production. German Pulp & Paper Assn. general director **Dr. M. Braunsperger** told the meeting German production rose 2%, but demand fell by 1% to 2%.

Indeed, European production has been hampered by a "drastic" reduction in the average annual growth rate of consumption, with Europe unlikely to double its per capita consumption in the forseeable future to approach U.S. per capita consumption, according to de Monts. Production in the E.C. from 1967 to 1972 grew at 4.5%/year but climbed at only 2.7%/year from 1976 to 1980, slowing even further in 1981 and 1982.

Table 2. **Printing/writing paper shipments, 1981-82**
(000 tons)

Grade	**1981e**	**1982e**
Uncoated free sheet total	7870	7907
Offset	1990	1981
Copy/duplicating (BMDX)	1911	1949
Forms bond	1569	1589
Envelope	854	833
Tablet	322	325
Text & cover	239	230
Other	985	990
Total coated paper	4947	5015
Coated one-side	440	430
Coated two-sides Nos. 1-4	1990	1930
Coated two-sides No. 5	2517	2655
Operating rates		
Uncoated free sheet	90.5%*	88%
Coated groundwood	92.0*	84
Coated free sheet	94.0*	94

e = estimate
*Pulp & Paper Week estimates
Source: American Paper Institute & Champion International Corp.

Table 3. **Coated paper shipments to magazine publishers, 1978-81**
(000 tons)

Grade	**1978**	**1979**	**1980**	**1981**
Coated two-sides, total	1902	1838	1969	2009
Nos. 1-4	365	400	405	408
No. 5	1537	1438	1564	1601
All grades	2064	2017	2125	2165
Coated paper imports	214	169	115	36

Source: American Paper Institute and Champion International Corp.

U.S. near record

U.S. production rose by 1.5% for 1981 and fell just 100,000 tons short of the 64.6 million-ton record set in 1979, with woodpulp production actually rising 2% to a record 54 million tons, according to Laun—and this in spite of a "sharp" downturn in the closing weeks of the year brought about by a 4.4% reduction in U.S. industrial production during the fourth quarter.

But weakness in overseas economies cut U.S. exports by about 9.6%, with linerboard export shipments sliding by 24% and pulp by 3.5%. Bleached board exports edged down 1.9% while printing/writing papers shot up by 15.3% to 391,000 tons.

Printing/writing order backlogs

That dramatic export success record was not matched in all areas of the U.S. printing and writing paper industry, however, Champion International Corp. vice president-planning and development **Bartley L. Reitz** told the gathering. Indeed, for U.S. printing and writing paper mills as a whole in 1981, "there was very little growth from 1979."

Order backlogs for those mills fell to an average of below 20 days, from around 30 days in 1979, according to API statistics cited by Reitz. "Although the backlog for most producers is not so bad as it was in 1975, it is presently very thin and large amounts of curtailment were taken by the industry in December, the worst month I can remember since '75," he noted.

Coated papers have done better than had been expected, he pointed out, with 1981 coated free-sheet paper shipments coming in 14% above what Reitz had forecast in November 1980. But coated free-sheet mills will suffer in 1982 as lightweight coated groundwood mills, which are plagued by excess capacity, take market share from free sheet in some areas.

Reitz expects to see shipments of coated two-side grades Nos. 1-4 fall by 3%, while No. 5 increases by 5.5%. He believes that commercial printing and direct mail catalog end-uses will continue to soak up more No. 5, countering the largely flat trend of magazine paper consumption.

Poor LWC operating rates

Even with that kind of output growth rate, however, LWC mills will see their operating rates deteriorate this year, as substantial new capacity comes on-stream. Operating rates will be in the low 80s by the second half—falling as low as 80% at mid-year when three new machines start up—and Reitz feels LWC operating rates will be "poor" until 1986.

One result of this capacity surge—at the same time as a jump in European and Japanese LWC capacity—will be a shakeout of uneconomic, small machines, while another will be cancellation of some contemplated projects, he predicted.

Last year's downturn in the U.S. uncoated free-sheet industry should begin to reverse itself this year, with operating rates reaching a respectable 93% in the fourth quarter from a first-period low of 85%—and heading into an "excellent" 1983.

Major factors in the improvement will be an end to the slide in bond/mimeo/duplicating/xerographic papers and offset papers, which will be more than enough to counteract a turn to flat growth on the part of forms bond.

Growth in cut-size papers and in the previously robust forms bond sector will be hampered early in the year by excessive user inventories, Reitz believes, but he thinks those surpluses will be worked off by the end of the first quarter.

Justifying capital investment

One symptom of economic weakness and growing inventories in the last year has been softness in printing/writing paper prices. Reitz noted that in the present situation, price levels as a percentage of what is needed to justify capital investments are only 70% in the case of new hardwood pulp mills, 85% with coated free-sheet web paper machines at existing mills, and 90% for uncoated free-sheet commodity-grade paper machines at existing mills.

But the U.S. printing/writing paper industry has short-term worries, too: Reitz noted that his GNP forecast, calling for 1% growth in 1982, is "on the high side of most forecasts I have seen." If the U.S. economy "fails to perform as I described, then my forecasts for white paper shipments are nonoperable," he added.

Pulp to Japan

Economic softness in the U.S. paper industry and in other countries that buy from Canada has an effect on purchases of Canadian pulp, both Reitz and McClay noted.

Canadian pulp shipments to the U.S. dropped by 4%, while European paper mill downtime both early and late in the year cut Canadian shipments to that market by about 9%, McClay said. A government-backed curtailment program in Japan cut Canadian pulp shipments to Japan by approximately a third, and new orders from China virtually disappeared during 1981, McClay added.

A 5% increase in Canadian newsprint shipments to the domestic market and 18% increase in shipments overseas were barely enough to offset a 1% drop in Canadian shipments to the U.S. brought about by a shift of U.S. newspapers to new U.S. capacity. Canadian newsprint shipments overall climbed by 3%, but CPPA thinks the 1982 shipment level might drop by 7%.

Consumption in the U.S. rose only 0.5% to 10.1 million metric tons in 1981, and the group thinks 1982 consumption will drop 1% following a decline in U.S. advertising that is predicted for 1982 by CPPA.

Canadian labor worries

Eastern Canadian pulp and paper producers can't grant the kind of wage increases sought by the Canadian Paperworkers Union in contract negotiations this year because of weak market conditions, **Raymond R. Pinard**, Domtar Inc. executive vice president and CPPA chairman, told the meeting.

The CPU, which represents most pulp and paper workers in Eastern Canada, feels the industry's claims of hardship are "window dressing," and is seeking wage increases of about 15% for each year of a two-year contract, plus improvements in benefits and inclusion of a cost-of-living increase clause.

Citing overcapacity in such grades as newsprint, threats from plastics in such markets as packaging, and higher operating costs for Canadian manufacturers to produce a ton of paper than for U.S. producers, Pinard disputed the union's claims that Eastern Canadian industry is distorting its profit picture.

"Surely we and our partners, the unions, can find a formula which can assure the continuing good health of our industry," he said. □

Table 4. **Printing/writing paper shipments, 1981-82**
(000 tons)

Grade	**1981e**	**1982e**
Uncoated free-sheet total	7870	7907
Offset	1990	1981
Copy/duplicating (BMDX)	1911	1949
Forms bond	1569	1569
Envelope	854	863
Tablet	322	325
Text & cover	239	230
Other	985	990
Total coated paper	4947	5015
Coated one-side	440	430
Coated two-sides, Nos. 1-4	1990	1930
Coated two-sides, No. 5	2517	2655
Operating rate		
Uncoated free-sheet	90.5%*	88%
Coated groundwood	92.0*	84
Coated free-sheet	94.0*	94

e—estimate.
*Pulp & Paper estimate.

Coated paper shipments to magazine publishers, 1978-81
(000 tons)

Grade	**1978**	**1979**	**1980**	**1981**
Coated two-sides (total)	1902	1838	1969	2009
Nos. 1-4	365	400	405	408
No. 5	1537	1438	1564	1601
All grades	2054	2017	2125	2185
Coated paper imports	214	169	113	36

Source: American Paper Institute and Champion International Corp.

Polyvinyl alcohol use holding steady

By BARRY SHOCKETT

In general, polyvinyl alcohol (PVA) markets have been relatively static the past four years, although there was a slight surge in 1979. An improvement in the U.S. economy could stimulate domestic sales, but most producers are aiming their expanded capacity for export markets. The overall market depends heavily on the textile industry, which should follow the overall economy.

The PVA industry operating rate was down to 71% in 1981, vs 74% and 77% in 1980 and 1979, respectively.

The Canadian PVA market is quite small and will not exceed 10 million lb before 1985. Paper industry use should increase, but this is a very small market.

U.S. statistics for polyvinyl alcohol (million lb)

	1978	1979	1980	1981e
Nameplate capacity	190	190	190	203
Production*	127	147.7	140.6	144.5
Imports	17.5	22	21	24
Exports	13	25	13	24.5
Apparent consumption	131.5	144.7	148.6	144
Total sales (SPI)	133	148.5	128.5	136
Todal demand†	137.5	145.5	136.5	135.5
Paper coatings	11	11.6	10.9	10.8

*excluding production for PVB
†total sales less exports plus imports

Sources: SPI Inc.; Bureau of Census, Foreign Trade Div.

Canadian statistics for polyvinyl alcohol (000 short tons)

	1978	1979	1980	1981e
Nameplate capacity	0.22	0.22	0.22	0.28
Production	0.2	0.2	0.2	0.2
Total demand	3.9	4.2	3.8	3.8
Paper coating	0.09	0.08	0.06	0.07
Imports	3.7	4	3.6	3.6

POLYVINYL ALCOHOL

UNITED STATES

Uses: PVA is used by the paper industry mainly as a surface size for printing and writing papers and paperboard, and as a coating binder. Other uses include textiles, adhesives, emulsifiers, and films.

Demand: In 1981, estimated total U.S. PVA demand (excluding that used for polyvinyl butyral (PVB) production) was 135.5 million lb. The paper industry used 10.5 to 11 million lb (8%) for sizing and coating. The textile industry is the largest user, consuming about 50%, while adhesives take 25%. Demand was down slightly from the previous year's 136.5 million lb, but well under the 1979 figure of 145.5 million lb.

Sources: There are three domestic suppliers (Dupont, Monsanto, and Air Products & Chemicals), which derive PVA from the hydrolysis of polyvinyl acetate. Imports have increased from about 13% of the total in 1978 to an estimated 17.5% in 1981, when 24 million lb were imported, mainly from Japan and Taiwan. PVA is available at various viscosity levels and degrees of hydrolysis.

Availability: Industry capacity is sufficient to meet current demand and no shortages are likely in the future, as suppliers are expanding their capacity. 1981, market; 1980, market; 1979, market; 1978, market.

Pricing: The current published list price of $1.05/lb for truckload quantities went into effect last summer and should not change before the second half of 1982. Pricing history: 1981, $1.00-$1.05/lb, delivered basis; 1980, 86.5¢-91.5¢/lb; 1979, 77.5¢/lb; 1978, 69.5¢/lb.

Forecast: Paper industry demand for PVA should parallel fine paper growth of about 3% to 4%/year. Growth in PVA use in paper coating is expected to be slow, or even flat, through 1985, except for certain specialty applications. Overall consumption should increase 6% to 7%/year due to stronger textile and adhesive markets. Adhesive use could grow 5% to 8%/year. Escalating pulp prices could lead to the utilization of higher filler loadings, which could spur PVA use as a sizing agent.

CANADA

Uses: Polyvinyl alcohol is employed as a surface size on fine papers and for water and grease resistance on specialty grades. The major end-use for PVA is for textile warp sizing.

Demand: Canadian paper industry demand for PVA in 1981 was an estimated 70 tons or 2% of the total. Total PVA consumption in 1980 and 1981 was 3800 tons. Textile applications consumed 2700 tons or 70% in 1981. Adhesives used about 700 tons (18.5%).

Sources: There is one small Canadian producer, Actol Chemicals, which uses most of its output captively. The bulk is imported from offshore and U.S. In 1980, more than 60% of the imports came from Japan and Taiwan.

Availability: PVA should be readily available since imports can easily meet the small tonnage required and no shortages are forecast. Supplies have been adequate for several years.

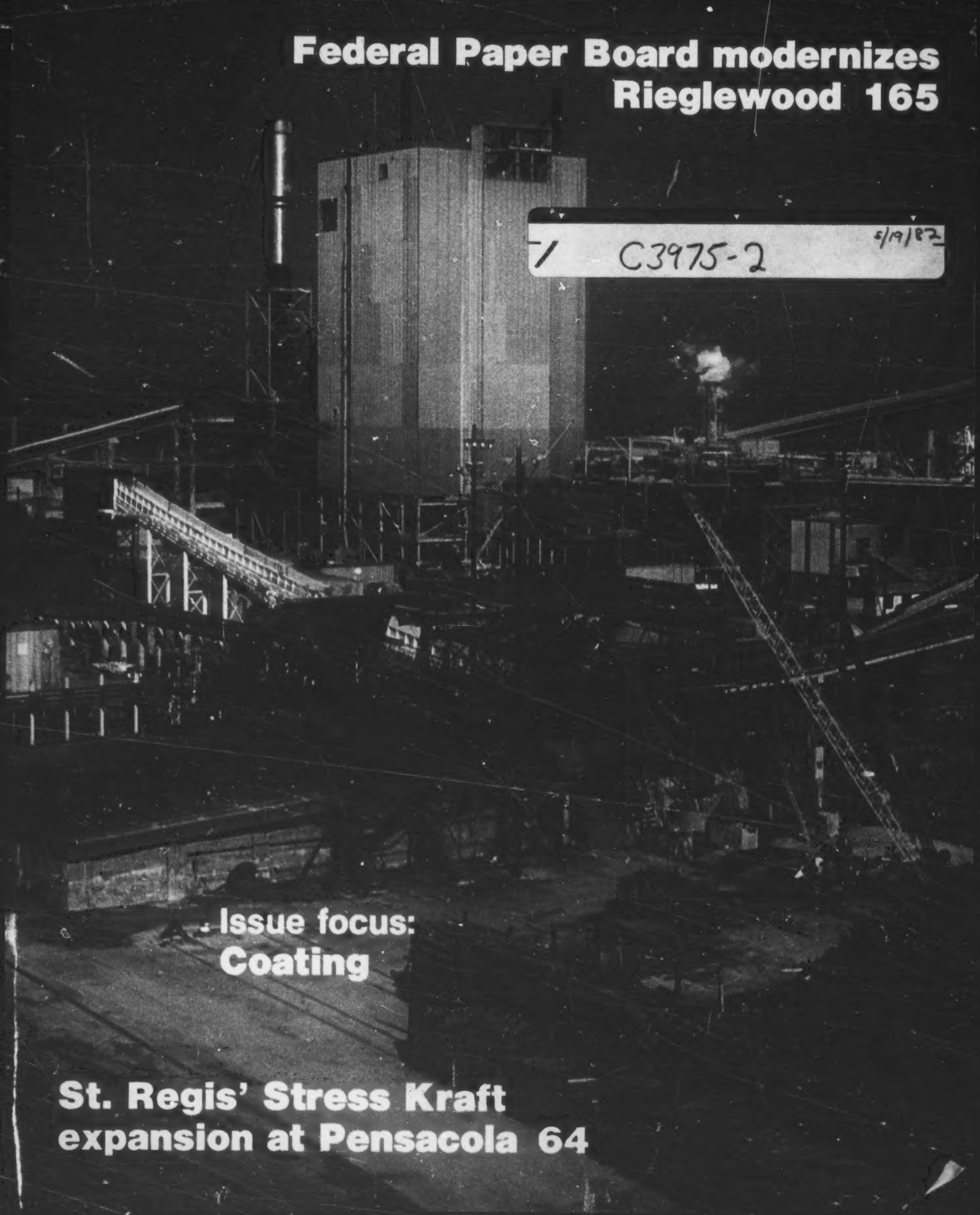
Pricing: Textile-grade PVA is listed at an average price of US$1.22/lb, freight allowed, Ont./Que. However, pressure from imports has dropped this to as low as C85¢, down from the 1981 level of 90¢-95¢/lb. Pricing history (list prices, U.S. funds): 1981, 75.3¢-$1.13/lb; 1980, 75.3¢/lb; 1979, 46.6¢-75.3¢/lb; 1978, 47.6¢/lb.

Forecast: Most markets have been relatively static recently and no change is forecast for 1982. Over the longer term, a modest increase in demand is likely. The adhesives markets should grow between 6% to 7%/year through 1985.

Mr. Shockett is consulting editor-chemical markets for PULP & PAPER.

PULP & PAPER

May 1982



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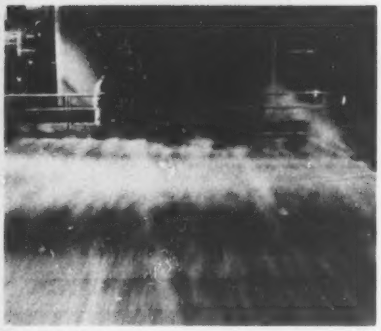

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Cover: Federal Paper Board's recent expansions at Riegelwood, N.C., include a new long log woodyard and 1500-tpd recovery boiler. (Staff photo by Kenneth E. Smith.)

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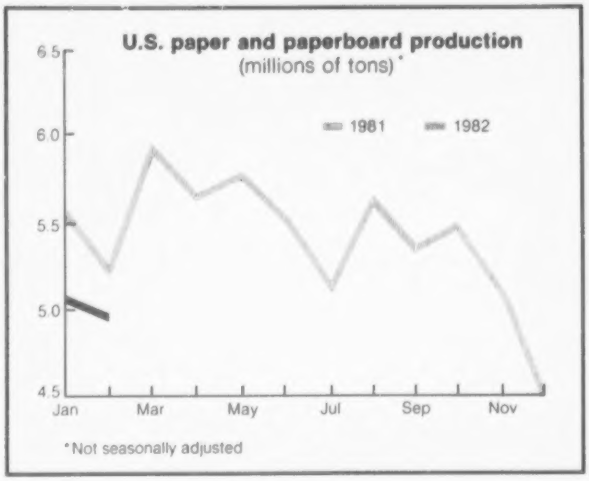
MONTH IN STATISTICS

U.S. paper and paperboard production continued to slow in February, totaling about 5.0 million short tons in the month, 4% below year-earlier production levels, according to the American Paper Institute. Adjusted for seasonal and workday factors, February production was at a 62.4-million-tpy annual rate, up from the 60.9-million-tpy rate estimated for January.

Among major grades, only newsprint production remained strong in February, up 6% over year-earlier levels. All other paper grades continued to fall below 1981 output levels, with a large decline in uncoated groundwood paper production, reflecting reductions in shipments to "other periodical" publishers and commercial printers, said API. Paperboard production, still harder hit than paper, registered year-to-year declines ranging from 3% for solid bleached to 8% for semichemical medium.

Total Canadian newsprint shipments in February came to 709,000 metric tons, up 3.7% over a year earlier, according to the Canadian Pulp & Paper Assn. Newsprint mill operating rates were 93%, down from 95% a year earlier. Chemical paper-grade woodpulp shipments came to 480,000 tons, down 15.3% below February 1981 levels. Operating rates were 83%.


U.S. paper and paperboard production
(millions of tons)*

*Not seasonally adjusted

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	February	416	5.9	5,244	7.8
Uncoated groundwood (s)	February	106	−7.0	1,288	−11.4
Coated paper (s)	February	374	−4.3	4,667	−4.7
Uncoated free sheet (s)	February	610	−2.7	7,541	−2.3
Unbleached kraft packaging and industrial (s)	February	300	−7.1	3,655	−7.7
Tissue	February	335	−5.1	4,133	−5.6
Total paper	**February**	**2,401**	**−2.1**	**29,642**	**−2.3**
Kraft linerboard, unbleached	February	1,154	−1.6	13,367	−7.6
Semichemical medium	February	357	−8.2	4,398	−8.0
Bleached paperboard	February	301	−3.2	3,649	−6.9
Recycled paperboard	February	551	−5.3	6,630	−8.5
Total paperboard	**February**	**2,448**	**−3.6**	**29,135**	**−7.5**
Total paper and paperboard*	**February**	**4,983**	**−3.8**	**60,418**	**−5.8**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	January	3,991	−8.8	47,897	−8.8
Market pulp production	January	425	−17.7	5,096	−17.7
Wastepaper consumption at paper / board mills	January	1,218	−8.1	14,616	−8.1
Pulpwood consumption (cords)	February	6,396	−4.5	76,752	−4.5
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft^2)	February	18.638	−6.4	37.593†	−9.0
Containerboard inventories at box plants	Feb. 1	2,545	39.1		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	January	675	−1.1	8,104	−1.1
Imports of Canadian newsprint	January	581	−0.2	6,975†	−0.2
U.S. paper exports (including products)	January	309	−18.6	3,705	-18.6
Exports of unbleached kraft linerboard	February	165	−1.8	1,782	4.1
Exports of woodpulp	January	221	−24.1	2,655	−24.1
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	February	709	3.7	1,380†	0.1
Operating rates	February	93%	95%	93%	94%
Inventories held by U.S. consumers	Feb. 28	1,634	32.4		
Woodpulp shipments (export only)	February	480	−15.3	931†	−16.1
Operating rates	February	83%	90%	83%	90%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn.
*Includes construction and wet machine grades. †Not annualized. ‡Not directly comparable to year ago because of coding change. (s) = shipments.

$368 million for pollution in 1980

1980 capital spending for environmental control by the pulp and paper industry reached $368 million, or 9% of the industry's total 1980 capital spending, according to the National Council of the Paper Industry for Air & Stream Improvement Inc. NCASI based its findings on a survey of the industry taken last year, which not only recorded 1980 spending but also projected spending in 1981 and 1982.

The paper industry spent the largest portion of its 1980 outlays on air-quality protection—$190 million. Total spending for water-quality protection, both process-loss control and external effluent management lines, came to $140 million, and spending for mill-site-generated solid waste management came to $38 million (see table).

As a percentage of total capital spending, 1980 pollution control outlays were the lowest in the last ten years, according to the survey. Since mid-decade, pollution control spending has steadily declined both in terms of total dollars and as a percentage of total spending.

NCASI also pointed out that 1981 spending projections were even lower than 1980's level, but that estimates for 1982 and beyond indicate an upward trend in environmental spending beginning in 1982. This higher spending will be necessary, NCASI noted, because water-quality regulations calling for major expenditures will be in place by 1984, imposing solid-waste disposal regulations are currently taking form, and an increasing emphasis is being placed on volatile organic emission control and reduced sulfur emission control at kraft mills.

Pulp and paper industry environmental spending through 1980 and planned through 1981
(Million dollars)

	Water	Air	Solid waste	Total	% of total spending
1970	120	65	2	187	
1971	134	66	3	203	
1972	205	129	5	339	36
1973	179	162	10	351	34
1974	216	296	11	523	31
1975	286	341	18	645	30
1976	319	216	29	564	29
1977	278	148	17	443	19
1978	182	149	32	363	16
1979	178	158	23	359	12
1980	140	190	38	368	9
1981e	87	152	59	298	

e — estimate.
Source: NCASI.

MERGERS

ITT having no luck selling Rayonier unit in 'buyer's market'

International Telephone & Telegraph Corp. has had no luck in its six-month-long bid to sell its Rayonier unit, and current economic conditions along with the state of the forest products industry will "make it very difficult to accomplish a sale" soon, ITT chief financial officer Cabell Woodward Jr. said recently.

ITT had hoped to get $3 billion from the sale of its four active mills, seven lumber mills and 1.1 million acres of timberlands, but one analyst noted that "it's no longer a seller's market in timber" while another said that only the 430,000-tpy Jesup, Ga., kraft pulp mill is really a prime property among the mills. In one analyst's words, "I guess they just didn't get an offer that they thought was good enough."

The conglomerate announced in September it would be willing to sell its Rayonier subsidiary (P&P, Nov., p. 13) after having said in early 1981 that it had no intentions of selling the unit. Then in November, Woodward said the company might be willing to break up Rayonier and sell it in parts. At the same time ITT also indicated it was in the midst of serious discussions with a major buyer. But that deal never materialized.

Prime property: ITT's Jesup, Ga., kraft pulp mill.

G+W buys Hammermill stake

Gulf + Western Industries Inc., which only recently sold off Brown Co., has disclosed purchasing a 5.8% interest in another paper firm—Hammermill Paper Co. In a filing with the Securities & Exchange Commission, G+W said it bought 474,600 Hammermill shares for about $12.2 million, strictly for investment purposes.

- **Meanwhile, Dorchester Gas Corp.** disclosed it holds about 1.7 million common shares of **St. Regis Paper Co.** purchased at a cost of about $52 million. The company said it considers St. Regis an "excellent investment" and may purchase more stock.
- **Louisiana-Pacific Corp.** has boosted its stake in **National Gypsum Co.** to 11.2% from 8.8% reported in late January. Altogether, L-P holds 1.73 million National Gypsum common shares, the company told the SEC.

Jim D. Rowland *is editor of* Canadian Paper Analyst, *a monthly newsletter based in Montreal, Que.*

Newsprint: The bloom is off the rose

After five consecutive years of improving profitability (aided in no small way by the drop and continued weakness in the value of the Canadian dollar), Canadian newsprint producers will face a very difficult operating environment in 1982. Lower operating rates, significant cost increases, and relatively little price relief will bring about a drop of at least 25% in the pre-interest, pre-tax profit per metric ton. In the worst case scenario, the drop could reach 50%.

The most important variable is the industry operating rate. Because of larger-than-normal capacity increases in North America, combined with a slowing in demand, the Canadian newsprint industry operating rate will probably fall in the 80% to 84% range (Table 1). This is the lowest level since 1975, when 20% of the annual productive capacity was shut down by a major strike.

Three newsprint machines will be starting up in 1982 and will obviously face more than the usual difficulties in marketing their tonnage. The new machines are at Crown Zellerbach, Elk Falls, B.C., and Donohue Normick, Amos, Que. (both scheduled to start up in the first quarter), and British Columbia Forest Products, Crofton, B.C. (at mid-year).

Canadian producers have announced a $25/metric ton, or 5%, increase for Mar. 1 or Apr. 1 for U.S. customers. But the increase may not be fully effective until this summer due to currently high inventory levels (57-day supply) and the 500,000 tpy of new newsprint capacity entering the North American market over the next several months (the three Canadian machines plus a machine conversion in the U.S.).

In this rather bleak environment, the Canadian newsprint industry is also looking at sigificant cost increases for all factors of production. Table 2 is an industry composite profit-and-loss statement for the 1979-82 period. The "gross selling price" and "transportation, etc." reflect a composite of the estimated Canadian dollar amounts for newsprint shipments to the three main market areas—Canada, the U.S., and offshore.

Table 2 is the "best-case" scenario, assuming an 84%+ operating rate, no inordinate cost increases (particularly for labor costs), and a Canadian dollar averaging at least a 20% discount from the U.S. dollar. Any change in these assumptions running counter to the best interest of the industry would correspondingly reduce the $75 pre-interest, pre-tax profit per metric ton. In short, 1982 will be, at best, a lackluster year; at worst, it could be an unmitigated disaster.

Table 1. **Canadian newsprint industry shipments, capacity, operating rates, 1979-82** (000 metric tons)

	1979*	**1980***	**1981***	**1982e**
Capacity	9,063	9,130	9,445	10,000
Production	8,756	8,625	8,946	8,000-8,400
Operating rate	97%	94%	94%	80%-84%
Shipments,	8,779	8,662	8,916	8,000-8,400
To Canada	971	980	1,045	1,040-1,060
To U.S.	6,371	6,118	6,062	5,410-5,690
To offshore	1,437	1,524	1,809	1,550-1,650
U.S. consumption	10,199	10,088	10,139	9,900-10,200

*In 1979, about 3% of capacity was lost as a result of strike activity; 1980 about 5%; 1981 about 3%. e=estimated.

Table 2. **Canadian newsprint industry composite profit-and-loss statement** (C$/metric ton)

	1979	**1980**	**1981**	**1982**
Gross selling price	**480**	**505**	**560**	**600**
Transportation, etc.	80	65	70	80
Net selling price	**400**	**440**	**490**	**520**
Fiber	90	100	112	125
Other supplies	40	44	50	60
Energy	45	51	60	70
Wages and salaries	85	95	108	125
Overhead	40	45	50	65
Total cost	**300**	**335**	**380**	**445**
Pre-interest, pre-tax profit/metric ton	**100**	**105**	**110**	**75**

Source: *Canadian Paper Analyst.*

Coated groundwood papers: No growth, operating rates dropping off

Statistics	**1980**	**1981**	**1982e**
Production, 000 tons[1]	2555	2804	2845
Capacity, 000 tons[2]	2762	3081	3364
Utilization rates, %	92.5	91.1	84.6
Imports, 000 tons	110	35	20
Exports, 000 tons	45	46	45
Apparent U.S. consumption			
000 tons	2620	2793	2820
lb/capita	23.54	24.85	24.83
000 tons/$billion real GNP (1972)	1.769	1.852	1.868

e=estimated

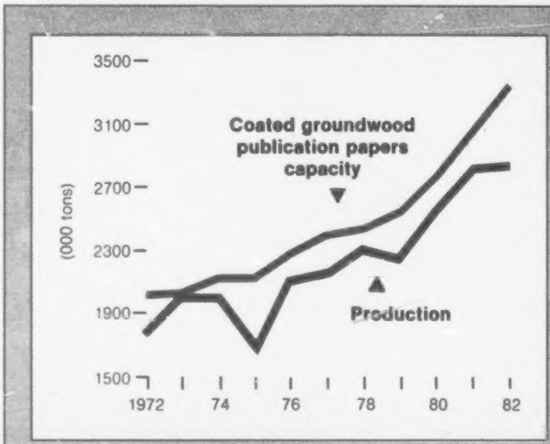
[1] PULP & PAPER estimates.

[2] API, capacity for coated groundwood grades; includes coated grades Nos. 5 and some of 4.

Grade structure: Coated groundwood publication paper is made from furnish containing 10% or more of mechanical pulp, with the balance consisting of chemical pulp. The group includes No. 5 paper and some No. 4, both coated-two-side. No. 4 has slightly higher quality and brightness standards, and much No. 5 is lower in basis weight than No. 4 paper. Basis weights commonly range between 32 lb to 70 lb (25 x 38 in.—500). These papers are used for rotogravure, letterpress or offset printing. Coat weight can represent up to 30% of total sheet weight in the case of lightweight coated (LWC) paper.

Production/capacity: Production continued the dramatic increases of recent years, jumping by 9.7% in 1981, according to PULP & PAPER estimates (American Paper Institute does not release production figures for coated groundwood). During that same period, capacity shot up by 11.5%—with another 9.2% increase in capacity planned for 1982. Three machines, with 543,000 tpy of capacity between them, are starting up in mid-1982, the last additions currently announced, and by the time they are fully absorbed, capacity between 1980 and 1984 will have jumped by 37.8%.

Outlook: Magazine advertising is expected to flatten out in 1982, and the other recent growth items for these papers—direct mail pieces and catalogs—may grow more slowly than in recent years as companies respond to weak consumer spending by weeding names out of mailing lists. If coated groundwood shows any growth in consumption in 1982, it will be because it continues to capture market share from uncoated groundwood while acting as a last resort for printers unable to get coated free-sheet for some jobs. The prospect beyond the current recession is for fast growth of coated groundwood, but operating rates will remain low enough for several years to cause problems when price increases are proposed.



Estimated 1982 capacities of major U.S. companies are:

	Annual capacity (000 tons)	**Capacity share** (%)
1. International Paper Co.	450	14.9
2. St. Regis Paper Co.[1]	423	14.0
3. Consolidated Papers	411	13.6
4. Blandin Paper	305	10.1
5. Crown Zellerbach	280	9.3
6. Boise Cascade	280	9.3
7. Nitec & Midtec Corps.	260	8.6
8. Fraser Paper Ltd.	160	5.3
9. Pentair Industries	160	5.3
10. Bowater Inc. (Bowater Carolina)	120	4.0

[1] Does not include new 168,000-tpy machine to start up around mid-year.

U.S. No. 5 capacity (1982)**: 3.014 million tons**
Capacity share of top five companies: 62.0%
Capacity share of top ten companies: 94.5%

Coated groundwood publication papers also include some No. 4 coated publication papers. The major producers of No. 4 are Mead Corp., Consolidated Papers, and Nitec & Midtec Corps.

Pricing: Prices did not rise between April 1981 and April 1982 and no increases were expected this year before October. The last increase that did stick was only partially successful, resulting in a year-to-year increase of 3.4%. Typical pricing trends ($/short ton) are: 1973, 285; 1974, 400; 1975, 385; 1976, 460; 1977, 500; 1978, 570; 1979, 637; 1980, 673; 1981, 735; and 1982, 760.

Markets: About 63% of No. 5 paper goes into magazines, with commercial printing taking another 17%, and catalogs accounting for 13%.

Upturn for the U.S. pulp and paper industry still seen in second half

High interest rates and looming budget deficits cause uncertainty about sustained recovery, but speakers at API Paper Week still see recovery ahead

PULP & PAPER STAFF REPORT

☐ Despite recent economic weakness, high interest rates, and large projected federal budget deficits, most speakers at the American Paper Institute's National Paper Week convention held in New York City in mid-March sounded an optimistic note about the chances for a pickup in pulp and paper demand in the second half.

"The expected recovery in business activity in the second half of the year will propel paper and paperboard production upward," API president **Louis F. Laun** said in opening remarks that were later echoed by other industry speakers. "With other industrial countries probably joining the recovery in 1983, export demand can add an additional increment to overall shipments of the industry," he added.

Forces for a recovery may already be in place, with business inventories declining, inflation abating, and a tax cut scheduled to take effect July 1 which will increase consumer spendable income, said API senior vice president **Norma Pace**. Nevertheless, she said insufficient liquidity and high interest rates will hold industrial production to a 2.4% rise in 1982 before a 7.9% jump forecast for 1983.

But **Sen. Pete V. Domenici** (R-N.Mex.) warned that a sustained recovery may not be achievable even in 1983 unless there is a change in the current Administration budget, under which the federal deficit may shoot up to $208 billion by 1985. "Deficits of the size projected could devastate our economy and drag down the economies of all other industrialized nations," he said.

Production picked up in February

"The close link between the economy and the paper industry was reconfirmed last year and is continuing in 1982," Laun said. "Production of paper and paperboard in 1981 was 1.2% above the 1980 level, almost the same as the growth in real gross national product (GNP)."

"The quarterly patterns in paper and real GNP were also similar; a strong first quarter was followed by a mild decline in the second quarter, renewed strength in the third, and a relatively sharp decline in the final quarter," he continued. "Production remained low in January 1982, but then strengthened in February."

Among individual grades, the most notable performance so far this year is in newsprint, Laun said. "Newsprint production is running well above year-ago levels, reflecting an increase in domestic newsprint capacity, higher exports, and a buildup in publisher inventories."

"Production of uncoated free sheet papers, which includes most of the paper used in offices, is holding close to year-ago levels, which is a remarkable performance in view of reduced business activity," the API president said. "Commercial printers—another major user of free sheet papers—are also maintaining their pace of orders at a fairly good level."

Tissue papers continue their modest growth, paced by population changes, he said.

"Packaging grades, on the other hand, are feeling the effects of the recession," according to Laun. Production of packaging and industrial converting grades of paper is below 1980-81 average levels. Strong competition with plastic films is part of the reason, as well as reduced output in many customer industries.

Paperboard production declined sharply in December 1981, with many producers extending their usual year-end closings. Production in January was also low. Inventories of containerboard at box plants increased 550,000 tons in 1981, which brought the weeks of supply to 8.4, a fairly high level, he noted. A correction is underway, and inventories declined 180,000 tons in January. Some of the downward pressure eased in February, and paperboard production advanced.

Upturn ahead for printing/writing?

Leading indicators point to a "cyclical upturn in the demand for printing/writing papers" before June, with shipments continuing to improve "through the end of 1983," according to **James L. Hutchison**, API vice president-paper group.

Hutchison pointed out that "during the last 30 years, a change in the direction of printing/writing paper shipments has consistently occurred after a similar move in housing." Printing/writing paper demand has turned up on the average, three to six months after an improvement in new housing permits—and permits appear to have turned around after an October trough, he said.

Another positive indicator is the 36% increase reported in February of purchasing agents experiencing slower deliveries of ordered products.

If API economic forecasts and "the continued growth in these papers relative to GNP" are considered, consumption of uncoated free sheet in the fourth quarter of 1983 should be running at an 8.6-million-tpy rate, up 10.3% from the 7.8-million-tpy rate of the first period of 1982, while the coated paper rate should rise 10.9% to 5.38 million tpy from 4.85 million.

In recent years, printing/writing paper demand has grown faster than the economy as a whole. With the help of an increase in coated groundwood capacity, the U.S. shifted from being a net importer of coated groundwood in 1979, to the tune of 150,000 tons, to being a net exporter in 1981 by 7000 tons. This accounted for about half of the 15.2% increase in coated No. 5 shipments during that two-year period, he noted.

Uncoated free sheet also outpaced the economy in recent years, and between 1979 and 1981 shipments of bond and writing paper jumped by 6.8%—in contrast with the 4.0% rise of coated free sheet.

Pulp stocks continue to climb

Market pulp inventories continued to climb in late February and North American and Scandinavian stocks neared 1.7 million metric tons at the end of the month, said **Dr. Ronald J. Slinn**, API vice president-pulp, materials and technology group. U.S. producers held 22% of that total; Sweden, 31%; Canada, 33%; Finland, 13%; and Norway, 1%.

"This total inventory on Feb. 28 represented 46 days of supply at the rate of shipments over the preceding three months, in contrast to 30 days of supply a year earlier and 11 days when the combined North American and Nordic producers' level was at its most recent lowest level in December 1979," he noted. But that is still a long way from the nearly 3 million metric ton level of February 1977, he added.

While avoiding a prediction about the timing of any upturn, Slinn noted that the cycles of the Norscan pulp industry over the last 11 years point to a period between peaks and valleys of 2 years and 9 months—with the next peak due in August or September, if that pattern holds.

Adding to the uncertainty, however, are fluctuations in the value of the dollar, the currency in which most pulp is sold on the world markets, whose movements have a direct impact on pulp purchasers' costs and pulp producers' revenues.

"Compared with 18 months ago, when the U.S. dollar was at its lowest recent rate of exchange against most major currencies, a Mexican pulp importer would today require 96% more pesos to acquire a U.S. dollar for his purchase," Slinn noted. "Likewise, an Italian would pay 50% more lire than he did 18 months ago. On the other hand, a U.S. dollar can be exchanged for 28% more Swedish kroner or 20% more Finnish markka than in the fall of 1980."

Another imponderable in the pulp market outlook is upcoming labor talks this year involving 3500 tpd of U.S. paper grade market pulp capacity and 1900 tpd of capacity in Canada, where most contracts expire Apr. 30. The outlook for negotiations in eastern Canada, where workers have demanded parity with those at western mills, is "not bright," Slinn said.

In a statistical profile of the industry, Slinn noted the U.S. is a significant pulp importer and exporter as well, having produced almost 46 million metric tons in 1981; 86% of that consumed on-site; 5% shipped to affiliated domestic mills; 4% to the domestic market; and 5% shipped overseas. At the same time, the U.S. industry's apparent consumption was more than 47 million tons; 84% from integrated sources in the U.S.; 4% from the domestic market; and 7%—including "tied shipments from Canada"—coming in the form of imports (see Table 1). The net result of this balance is that the U.S. consumed 1.2 million tons more than it produced.

Current capital spending plans are unlikely to alter that balance, Slinn noted, although "beyond 1984, there is a distinct prospect that the U.S. industry could achieve a larger degree of fiber self-sufficiency and, therefore, a potentially higher level of pulp exports."

Consumption of wastepaper up

"Despite problems affecting many sectors of the nation's economy, increased use of wastepaper in the U.S. and the overall increase in total collections were surprising and encouraging," said **J. Rodney Edwards**, API vice president-paperboard group.

Consumption of wastepaper at U.S. paper and paperboard mills reached an all-time record of 15.56 million tons in 1981, up 469,000 tons from 1980 and 43,000 tons over 1979, the previous record year. Exports declined by 452,000 tons to 2.21 million in 1981. Therefore, total col-

Table 1. **U.S. chemical paper grade market pulp consumption**

	1970		1981	
Market grade	**Metric tons** (000)	**% of total**	**Metric tons** (000)	**% of total**
Sulfite	570	17	295 (241)*	7 (6)*
Bl. swd kraft	2490	73	3040 (3018)	67 (69)
Bl. hwd kraft			990 (982)	22 (22)
Unbl. kraft	325	10	177 (149)	4 (3)
Totals	**3385**	**100**	**4502 (4390)**	**100 (100)**

* 1980 production and consumption.

Source: American Paper Institute.

Table 2. **U.S. wastepaper recovery 1981-80**
(000 short tons)

	U.S. paper/paperboard mill consumption*	Exports	Consumption for other uses	Total
		1981		
News	2576	425	300	3301
Corrugated	7157	991		8149
Mixed	2322	474		2796
High grade deinking		130		
and pulp substitutes	3507	192		3830
Totals	**15,563**	**2213**	**300**	**18,076**
		1980		
News	2564	425	300	3289
Corrugated	6866	1209		8075
Mixed	2268	649		2917
High grade deinking	1142	176		1318
Pulp substitutes	2254	204		2458
Totals	**15,094**	**2664**	**300**	**18,058**

*Includes consumption at plants making molded pulp products.

Source: American Paper Institute; U.S. Bureau of Census (export data).

lections to meet domestic and export demand were only up slightly to 18.08 million tons in 1981, compared to 18.06 million tons in 1980 (see Table 2).

Based on just over 68 million tons of paper and paperboard used last year, the wastepaper collection rate for 1981 was 26.6%, according to Edwards.

"Projections for the use of recyclable paper in 1982 will continue to depend largely on the nation's economy, particularly on the demand for packaging, tissue products, and newsprint," he noted. "In addition, if production of autos and building of houses remain at low levels, use of wastepaper will be reduced."

In 1981, recycled paperboard accounted for 42% of wastepaper consumption compared to more than 70% in 1970. "From 1970 to 1981, however, annual production of recycled paperboard remained relatively constant, while there was a significant increase in the use of wastepaper at mills making containerboard, newsprint, and tissue products," Edwards said.

Total collection of old newspapers in 1981 was 3.3 million tons, indicating about 30% of the newspapers published in the U.S. are collected for recycling.

Collection of used corrugated in 1981 was 8.1 million tons, of which 1.9 million was corrugated box plant clippings. The remaining 6.2 million tons of used boxes represent a 36% collection rate.

High-grade use in 1981 was up slightly from the 1980 level due to additional use in tissue products, which more than made up for the decline in exports.

At the end of 1981 wastepaper use declined due to mill shutdowns, but in recent weeks production has returned to more normal levels, Edwards said. "Expanded demand for recyclable paper from both U.S. mills and export customers is projected to occur in the third and fourth quarters of this year."

Industry energy use cut by 30.4%

The U.S. paper industry, according to 1981 data, had reduced by 30.4% its use of fossil fuels and purchased energy per ton of output from the preoil embargo base year of 1972, said **Sara H. Freund**, newly appointed director of API's energy and materials department. "While total production of paper and paperboard increased by almost 18% during this time period, the industry's total fossil fuel and purchased energy use decreased by over 11%, and its fuel oil use by 40%."

She noted the industry has taken advantage of its own wood residues and spent pulping liquors, with these self-generated sources of energy accounting for 50.1% of the industry's total energy consumption in 1981 compared to 40.5% in 1971. □

Insti
HALSEY

Prospects for amending the Clean Air Act are discussed by Rep. Thomas A. Luken, author of a bill earlier endorsed by API chairman Brenton S. Halsey (right).

National energy policy was the subject of a discussion among API president Louis F. Laun, Rep. John D. Dingell, and API vice president Ronald J. Slinn.

Coating, filler pigments: generally available, pricing competitive

P&P's annual survey reports pigments are available even though demand is high. Pigment pricing is competitive as some paper markets slow

PULP & PAPER STAFF REPORT

☐ The demand for coated paper in 1981 reached record levels as shipments rose about 6.0% over 1980 to 4.95 million tons. This strong performance kept demand for coating pigments high. The uncoated printing/writing paper market did not perform as well in 1981 vs 1980, as most of the largest free-sheet grades saw demand drop. This resulted in a slightly reduced demand for filler pigments in 1981. The record 7.98 million tons of uncoated free-sheet shipments in 1980 contributed to a large surge in filler pigment demand. To meet this growth in demand for pigments, producers have expanded production capacity over the last few years. The result is that the tightness previously reported for some pigments has eased.

Most pigment producers report that demand in general has held up fairly well in the first part of 1982, although some producers whose product lines are concentrated in grades not performing as well overall note that business is slow.

There is considerable uncertainty about the performance of the overall economy in 1982, but most suppliers say they expect business to pick up in the third or fourth quarter.

Kaolin clays

Kaolin clays are produced in a variety of grades and a broad range of prices; thus, it is difficult to forecast general trends in pricing and availability. To simplify the understanding of current market conditions for clays, it is convenient to divide the market into three categories: (1) premium clays, (2) commodity coating clays, and (3) filler grades.

Paper industry demand for kaolin clay, the major pigment used, reached a new high in 1980 of 3.47 million tons, up almost 11% over 1979. The surge in coated paper consumption that occurred in 1981 kept demand for these clays at a very high level. The record 7.98 million tons of uncoated free-sheet shipments in 1980 led to a surge in filler pigment demand to almost 1.2 million tons. Offshore markets in 1980 were also a good market for suppliers with about 0.76 million tons of kaolin exported for use as coating/filler clays. Demand for filler clays in uncoated free-sheets in 1981 was to be reported good, but free-sheet paper production decreased from year-earlier levels.

Kaolin clay mining, production has grown over the last few years due to increased coated paper production. *(Photo courtesy Georgia Kaolin.)*

Supply of premium clays, such as anhydrous, high-brightness No. 1 and delaminated grades, has eased since these clays were in short supply in 1980-81 and are currently generally available. Delaminated grades, used in lightweight coated publication grades, are available even though demand has grown considerably since capacity to produce these clays has been expanded. Filler grades, which were reported to be in tight supply in 1980 and somewhat tight in 1981, are available, and shortages are not foreseen.

Installation of several spray dryers, kilns, and other processing equipment has eased the supply situation considerably for kaolin clays.

As coated paper markets softened in late 1981 and early 1982, demand from mills producing these grades eased. This, in combination with uncertainty concerning the performance of the economy, has resulted in a very competitive pricing situation. Discounting is reported to be prevalent and prices are, in some cases, at 1980 levels. Several suppliers report that spot orders are more common and as one producer noted, "Mills will ask what the best price is this month."

In general, prices rose 6% to 11% from those reported in last year's survey. The quoted price for air-floated filler grades is unchanged. One producer noted that the slower rise in the price of fuel, and thus in energy costs, have helped keep price increases at a slightly lower lever.

Calcium carbonate

Both natural ground and precipitated calcium carbonate (PCC) are reported to be in good supply. Demand for PCC grades is reported to be relatively stable, while ultra- or super-fine ground calcium carbonate usage continues to grow, according to some suppliers.

One producer noted that overall business is off, mainly due to weak paint, caulking, and sealing markets. Paint producers normally build up inventory in the spring, but this year many are not doing so due to the high cost of inventory as well as to uncertain business prospects. Instead, a number of paint suppliers are running seasonal specials. In general, carbonate producers report paper industry demand has held up fairly well relative to other markets.

One area in the paper industry that has attracted considerable interest during the last few years is alkaline sizing or papermaking. This could have a big impact on carbonate usage as a filler pigment and could open up a large new market. In general, suppliers report that interest in alkaline papermaking is at a very high level, but that actual growth in demand reported varies. One supplier noted that while many mills will run trials, the number switching over from the acid side is still limited. Since, as he noted, "In good times mills resist any change that may result in downtime and lost sales and in bad times they can't afford to switch." However, one producer claimed that four to six mills have switched over since late 1981. Prices advanced about 9.8% for ground carbonate, while price of precipitated grades rose 12.8%.

Titanium dioxide

Producers report that nonpaper markets have weakened considerably, and both rutile and anatase titanium dioxide (TiO_2) grades are readily available this year. As a result of more stable paper industry use, the market share for TiO_2 paper coating and filler applications has grown. One producer noted that only limited incremental expansions are planned in the future, so that when the economy—and thus overall demand for TiO_2—picks up, the supply/demand situation could change quickly. However, no shortages are foreseen until at least 1983-84.

Prices for TiO_2have advanced 9% to 12% over those reported in last year's survey. At least one producer has a $0.01/lb premium for dry over slurry shipments. Most producers eliminated this in the late 1970s.

Plastic and inorganic pigments

Plastic pigments used by the paper industry are reported to be in good supply, and prices increased about 8.7% since last year's survey.

Urea formaldehyde pigments are available and prices reportedly rose considerably during the year.

Table 1. **U.S. titanium dioxide pigment supply and demand** (short tons)

	1976	1977	1978	1979	1980p
Production	712,940	687,103	700,755	741,465	714,278
Shipments:[1]					
Quantity	711,774	696,552	714,547	753,780	731,546
Value (000s)	$594,846	$602,383	$621,909	$720,265	$795,734
Imports	68,497	114,810	117,708	104,968	97,590
Exports	20,580	16,336	37,812	49,369	42,126
Stocks, end of period	113,873	114,447	93,370	54,008	82,558
Apparent consumption[2]	753,947	785,003	801,728	836,426	741,192

r=revised. p=preliminary. n.a.=not available.

1. Includes interplant transfers

2. Apparent consumption=production plus imports minus exports minus stock increase.

Source: U.S. Bureau of the Census & U.S. Bureau of Mines.

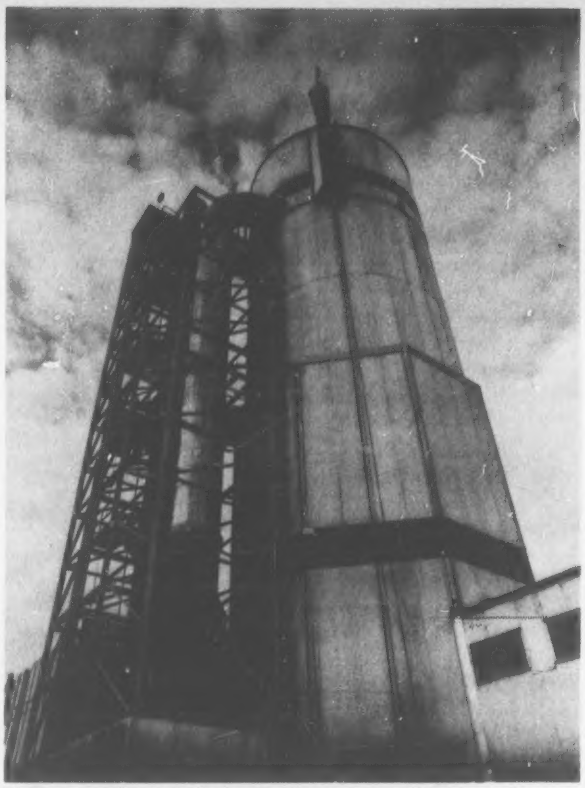
Table 2. **End-use distribution of titanium dioxide pigment shipments** (percent of total shipments)

End use	1976	1977	1978	1979	1980
Paints, varnishes, lacquers	51.1	52.0	47.9	47.4	44.1
Paper	21.4	20.7	20.8	21.8	24.3
Plastics (except floor covering and vinyl-coated fabrics and textiles)	10.6	11.7	11.6	11.8	10.6
Rubber	2.7	3.1	2.8	2.9	2.1
Printing ink	2.0	2.0	2.0	1.9	2.8
Ceramics	1.9	1.9	2.1	1.9	1.7
Other	7.4	6.2	6.7	7.1	8.2
Exports	2.9	2.4	6.1	5.2	6.2
Total	100.0	100.0	100.0	100.0	100.0

Zinc-oxide pigments, which are used in reproductive paper applications, are in good supply, and prices rose a modest 6.4%. Reportedly, prices have fluctuated recently due to the change in the price of zinc metal. The use of photoconductive-grade zinc oxide pigments has decreased over the last few years, but is expected to remain stable.

The price of silica-silicate pigments rose 8.2% over year-earlier levels. These pigments are reported to be available, with no supply problems anticipated.

The supply of talc has eased, and these pigments are generally available. Talc was reported to be in somewhat tight supply in 1980, but new capacity came on-stream last year. Talc prices advanced approximately 13% over 1981 levels. ☐



New capacity installed recently, such as this spray dryer at Georgia Kaolin, Dry Branch, Ga., has enabled pigment producers to meet demand without major shortages.

Table 3. **Kaolin used by U.S. paper industry**
(short tons)

	1978	1979	1980
End use			
Coating	2,238,397	2,273,883	2,282,914
Filling	764,597	858,305	1,182,929
Total	**3,002,994**	**3,132,188**	**3,465,843**
Exports			
Coating	523,629	580,435	691,446
Filling	52,011	53,941	72,429

Source: U.S. Dept. of the Interior, Bureau of Mines.

Table 4. **Prices and availability of commonly used pigments for coating and filler applications**

	Availability[1]		**Price quotations ($)**[2]		**Year-to-year**
	1981	**1982**	**March '81**	**March '82**	**Increase** (%)
Calcium carbonate					
Ground natural, medium, ton dry	Market	Market	86-97	91-110[3]	9.8
Precipitated, bag, ton[4]	Market	Market	130-175	144-200	12.8
Hydrated alumina, slurry, ton	Market	Market	365	365	0
Kaolin, clay, ton[5]					
Anhydrous kaolin	Market to tight	Market	310	345	11.3
High brightness, No. 1	Market to tight	Market	128-133	133-144	6.1
Delaminated, standard grades	Market	Market	87-100	88-115	8.6
No. 1 coating	Market	Market	78-94	84-106	10.5
No. 2 coating	Market	Market	61-75	66-86	11.8
No. 3 coating	Market	Market	73	64-77	—
Filler,					
Water-washed	Market to tight	Market	46-58	51-62	8.6
Air-floated	Market	Market	30-40	30-40	0
Plastic pigments, lb	Market	Market	0.69	0.75	8.7
Satin white, 100 lb, drum 37% solids	Market	Market	10.50	12.00	14.3
Silica-silicates, ton	Market	Market	485-490	520-535[6]	8.2
Talc, bag, ton	Market	Market	134-160	158-174	12.9
Titanium dioxide					
Anatase, lb, dry	Market to tight	Market	0.64	0.69-0.73	10.9
Anatase, lb, slurry	Market to tight	Market	0.63-0.64	0.69-0.70	9.4
Rutile, lb, dry	Market	Market	0.69	0.75-0.80	12.3
Urea-formaldehyde, lb	Market	Market	0.78	1.15[7]	47.4
Zinc oxide, lb	Market	Market	0.50-0.51	0.5275-0.5475[8]	6.4

1. Availability terms are defined as follows: Very tight—on allocation or demand significantly greater than supply; Tight—demand slightly greater than supply; Market—supply and demand in balance or excess capacity available.
2. Prices are based on quotations for bulk f.o.b. plant shipments, except where noted, but do not necessarily represent the range in prices listed by all producers.
3. Higher-quality ultrafine and fine-ground calcium carbonate grades are available at $20-$40/ton more than the highest price.
4. Bulk shipments are $32-$45/ton lower.
5. Slurry shipments of kaolin clays are $6/ton lower on a dry basis. Shipment in 50-lb bags usually commands a premium of $20-$22 over bulk prices.
6. Silica-silicates having lower brightness and larger average particle size are available for $20-$35/ton less than the quoted prices.
7. Urea formaldehyde pigment having finer average particle size is available at $0.40/lb more than the quoted price.
8. Price per lb truckload quantities, add .05 less than truckload quantities.

Coated groundwood mills facing downtime—even free-sheet hurting

Printers cut inventories while direct mail and magazine demand slip; weakness postpones price hikes in coated free-sheet

By DAVID R. ALLAN, News Editor

☐ Coated paper outperformed most other sectors of the paper industry in 1981, and demand continues to reflect the preference of advertisers and publishers for high-quality graphics; but shipments this year will be hurt by the same recession that is leading to downtime in uncoated paper, newsprint, paperboard, and pulp.

About the best that can be said is that coated paper mills might not feel the economic downturn quite as severely as some other segments of the industry. But at the same time the largest part of the coated paper industry—the coated groundwood sector—faces a tougher time in the next three years than it has for some time; and it should see more downtime and possibly even permanent shutdowns, than most other sectors.

Coming after a year in which coated paper shipments rose by 6.0%, there were signs of weakness in demand as early as January 1982. Paper merchants reported reduced orders from printers, while magazines took 6.6% less coated paper in January than in the same month last year. Observers predicted a modest slackening from the hot pace of 1981 in direct mail promotion, and lead times for coated free-sheet fell from six or eight weeks in mid-1981 to two or three weeks in 1982's second quarter.

But worst of all, the previously invincible coated free-sheet industry apparently failed to get a price increase through in March and April, the first such failure in several years. At least one mill was reportedly still trying to put a 5% increase into effect in May, but it was not clear whether that move would succeed. Coated groundwood mills were also forced by market conditions to forego a price hike at that time, meaning that by this fall some mills will have gone 18 months between increases—assuming they can raise prices at that time.

Drop in direct mail ads

An apparent drop in spending for direct-mail advertising was blamed by one merchant for a decrease in his coated free-sheet orders. And one mill executive cited a Merrill Lynch study indicating that weakness in direct mail promotional activity began showing up in late 1981, with printers also reducing inventories. The unprecedented pace of direct mail in 1981 would be impossible to sustain in the middle of a moderately severe recession, he noted.

Shipments of coated free-sheet in January, along with reported consumption levels in February, confirm that market weakness had been growing in recent months. One executive estimated that shipments of coated No. 1—up 24.3% for all of 1981, and the hottest performer of the coated paper industry last year—rose only 2% in January, trailing the 3.6% rise of coated No. 2. The rest of the coated paper industry actually showed declines in January, the worst being No. 3 with a 9.2% slide. February shipment statistics were expected to confirm these trends.

Small companies can't afford it

Most important end-use for coated free-sheet—shipments to the commercial printing market—showed an increase in January of only 0.2% by all grades of paper, coated and uncoated; while coated shipments to that market slipped by 2.8% and Nos. 1, 2, and 3 fell by more than that percentage.

One merchant called that drop-off more of a lull than a long-term trend, and indicated that advertising agencies and advertisers he had polled said they had printing orders ready to go—when business picked up a little. "People had been spending more on advertising and promotion in hopes of offsetting a decline in their business, and maybe some of the intermediate- and small-size companies can no longer afford to do that," another merchant speculated.

Merchant commission added

Merchants began picking up signs from coated free-sheet mills early in the year that business was not what it had been. One mill reintroduced a No. 1 premium coated cover in the 100-lb basis weight range after several years of shunning the product. Another mill tried to raise the price of its No. 4 coated web offset paper by 5.2% effective Jan. 1, but then in February was forced to give back most of that increase, and even added a 5% merchant commission for the first time—in effect driving the price below the level that had pertained before Jan. 1. The mill also introduced a 55-lb paper in that grade for the first time.

Such changes in product and price are not unheard of in coated free-sheet, but they run counter to the trend of the past year or more, when strong demand and a lack of new capacity kept coated free-sheet on allocation and made regular price increases a matter of course.

Operating rates good

Operating rates are still very good for coated free-sheet. One mill executive estimated that the coated free-sheet industry in February ran at 92.3%, slightly down from January's 93.4%, but better than the 90.2% of uncoated free-sheet in February. Despite that continued strength in operating rates, the three companies that had announced price increases for March and April postponed or rescinded them.

Coated free-sheet operating rates should average only 90% for the next two years and then just 91% in 1984, one executive forecast, which led another observer to note that such a prediction doesn't leave much leeway for the hefty price increases of recent years.

Drop in shipments

Still another mill executive, Bartley Reitz of Champion International Corp., predicted, in a presentation before the Canadian Pulp & Paper Assn.'s annual meeting in Montreal in January, that increased poaching by coated groundwood on traditionally strong coated free-sheet terrain, such as commercial printing and direct-mail catalogs—with coated groundwood capacity growing by 9.2% in 1982, far in excess of any likely demand increases in traditional coated groundwood markets—will lead to a drop of 3% in coated two-sides Nos. 1 through 4 shipments this year, while No. 5 will rise by 5.5%.

This kind of a shipment increase for coated No. 5 obviously will not permit a continuation of current high operating rates, with 543,000 tpy of new coated groundwood capacity coming on-stream around the middle of this year. Coated groundwood operating rates in February were a surprisingly healthy 93.5%, compared with 89.8% in January. But Reitz, for one, told CPPA he believes the lightweight coated paper operating rate will decline to around 80% when the three new machines are in operation, and will remain "poor" until 1986.

Shipments by grade, C2S paper
(short tons)

Grade	January 1982	January 1981	% change
No. 1	14,400	14,200	2.0%
No. 2	29,200	28,200	3.6
No. 3	58,400	64,300	−9.2
No. 4	63,100	68,100	−7.4
No. 5	205,300	210,200	−2.3
Shipments by major end users			
Commercial printing			
Nos. 1-4	108,300	112,600	−3.8
No. 5	34,700	34,400	0.7
Magazines			
Nos. 1-4	30,700	38,400	−20.1
No. 5	132,300	136,000	−2.7

Book sales rising

One executive cited a Merrill Lynch Economics study that showed a six-month lag between changes in personal spending on goods and changes in consumption of coated paper and uncoated groundwood, indicating a decline this year in use of paper for merchandising purposes such as advertising and promotion.

The Dept. of Commerce predicted book sales, adjusted for inflation, will rise by 3.1% this year and then 3.2%/year for the next five years; and shipment figures for 1981 showed coated paper shipments to book publishers rose 7.3%, with only No. 5 declining. But coated book paper shipments dipped by 4.2% in January, and it is too early to tell whether 1982 will be as good to coated book paper as 1981 was.

What is clear is that printing/writing paper mills are going to be jockeying for position for the remainder of this year and beyond to cope with a significant capacity bulge in coated groundwood, uncoated groundwood, and newsprint. Coated groundwood, in particular, is expected to make life rough for uncoated groundwood, with the price advantage of the uncoated grades being eroded by the low demand and excess supply of the coated paper.

Coated vs uncoated

In the catalog area, for example, one executive estimates uncoated groundwood shipments were off by 6.3% last year, while coated No. 5 shot up by 14%. Uncoated groundwood still represented 60% of all catalog paper shipments, he said, with coated No. 5 representing nearly all of the rest. But in January, with shipments of all papers to catalog producers down by 7.9%, No. 5 fell only 5.2%, and uncoated groundwood was down by 14% for the month. In shipments to magazine publishers, book publishers, and commercial printers, No. 5 also outperformed uncoated groundwood, although that did not always represent a straight trade-off between the two

Table 1. **Coated paper capacity changes, 1980-83**

Company	Location	Capacity (000 tpy)	Year
COATED GROUNDWOOD			
Crown Zellerbach	West Linn, Ore.	15	1980
Fraser Paper Ltd.	Madawaska, Maine	80	1980
Great Northern	Millinocket, Maine	45	1980
International Paper	Jay, Maine	112	1980
Midtec	Kimberly, Wis.	125	1980
Boise Cascade	Rumford, Maine	160	1981
Consolidated	Wisconsin Rapids, Wis.	14	1981
Mead Corp.	Escanaba, Mich.	200	1982
St. Regis	Sartell, Minn.	168	1982
Weyerhaeuser	Columbus, Miss.	175	1982
COATED FREE-SHEET			
Mead Corp.	Escanaba, Mich.	20	1980
Westvaco Corp.	Luke, Md.	70	1980
Plainwell	Plainwell, Mich.	11	1981
Scott Paper	Skowhegan, Maine	200	1983

grades.

Not all of the new coated groundwood capacity this year will have a direct impact on uncoated groundwood mills. The new 168,000-tpy St. Regis Paper machine in Sartell, Minn., is intended for the same lightweight coated paper market that St. Regis already serves with so much market effectiveness—a market that supercalendered uncoated groundwood paper, for example, might be intended to serve as well. But the new Mead Corp. machine, 200,000 tpy of capacity coming on-line in about June, may be aimed at the 45-lb to 60-lb basis weight range and may even produce some coated free-sheet, merchants who have been contacted by Mead speculate.

New sc machine

The new 175,000-tpy machine that Weyerhaeuser Co. is starting up in Columbus, Miss., after the middle of the year, seems likely to be dedicated in large part to papers 40 lb or higher, with commercial printers and small specialized magazines in mind, according to industry speculation.

But the indirect effect of those three machines on the whole market will be substantial. And one grade of paper that will feel much of the impact will be uncoated groundwood, with a new machine of its own that started up in the U.S. in late 1981.

Madison Paper Industries brought its new 150,000-metric-tpy supercalendered-uncoated groundwood machine on-stream at perhaps the worst time for the supercalendered (SC) paper market as a whole, some industry executives say. That machine started up while uncoated groundwood mills were feeling the pinch of the recession, even before much of the rest of the printing/writing paper industry. U.S. shipments, the only reliable record of North American production, fell by 3.8% in 1981, while all coated grades were rising by 3.5% or more. CPPA capacity projections indicate thatCanadian groundwood specialties capacity will rise by 31%, or more than 200,000 metric tpy between 1980 and 1983.

Finns win deal

The world nature of the SC market was indicated by the recent startup of a 150,000-metric-tpy machine in Finland, and the closing of a deal between a Finnish company and Canada's *Today Magazine* to supply the publication with SC paper for the next two years—at a price reportedly well below the list price asked by Madison for its SC grades.

Publication paper manufacturers of every description are looking for a new niche to keep machines going, executives say, and the result is sowing price confusion in the market and inducing many mills to consider major changes in market thrusts. Boise Cascade Canada Ltd.'s Kenora, Ont., newsprint mill might get a supercalender, with the intention of producing a supercalendered newsprint-type paper similar to that being made at Consolidated-Bathurst's Grand Mere, Que., mill. And the Grand Mere mill will be getting a new supercalender this year to allow for a substantial increase in its SC paper output.

Madison's paper is equal to the best in North America in terms of quality, observers say, and is priced at $638/short ton for 34-lb paper, similar to the $642 St. Regis paper produced at Deferiet, N.Y., and Sartell, Minn.; CIP Inc.'s $625 product; and the competing Finnish imports, listing at $630. St. Regis makes about 120,000 tpy of SC paper when operating at capacity, while Finnish mills—aside from a recent deal to supply SC paper to Canada's *Today Magazine*—sell 15,000 tpy to the *New York Times*. The *Times* buys another 15,000 tpy from Madison.

Premium roto on market

CIP makes some SC paper at Trois Rivieres, Que., and is said to be considering making an SC newsprint at Gatineau, Que. Complicating the overall market picture even more (one observer described the trend in groundwood specialties products and prices today as one of "fragmentation") was Madison's first-quarter action in offering an SC sheet called SCX; it's different from its regular SC paper and priced 5% over premium roto prices, in addition to some startup tonnage that was offered before that. Madison and St. Regis are also said to be putting about 40,000 tpy each of premium roto on the market, to utilize under-used SC machine capacity; and Great Northern Nekoosa is reported to have contacted printers about the possibility of selling them some SC paper from its Maine operations.

The number of customers for SC paper is almost as small as the number of suppliers, and it is not clear that the customer base is growing as fast as the range of producers. Catalog printers are probably the SC industry's most important customers, and Madison is said to have made some inroads into the Montgomery Ward and JC Penney accounts. St. Regis apparently sells SC paper to Sears on a cost-plus basis; but a similar deal with the other two major catalog producers might not have prevented Madison from selling them some paper at St. Regis' expense.

So far, few SC conquests have been at the expense of coated paper, however. *Consumer Reports* is rumored to be considering a move to SC in an effort to trim costs, although it is thought to be undecided between Madison and St. Regis papers. Some religious publications and fraternal-order magazines are looking at SC paper, and one consultant thinks premium roto and SC are the ideal paper for heat-set offset printers.

Print quality on SC paper is better than for typical uncoated groundwood offset paper and, in some cases might even be better than premium roto, although offset and premium roto are $100/ton or more cheaper. On the other hand, LWC is higher than SC in list prices by about $130—although recent transaction prices for LWC spot orders are well below list—so SC is well-positioned between LWC and its chief uncoated groundwood competitors.

Despite the seeming attractions of SC paper, it has not yet set the paper industry on fire. Madison seems destined to become at least a minor force in the premium roto market just to keep its new machine busy, and when the new machine is busy with SC orders, the company apparently will restart its old 40,000-tpy No. 1 SC machine, currently idled, to produce roto paper. That sheet will have a clay content of 4% or 5%, benefiting from broke from the new SC machine. That split personality, also seen in St. Regis' increased involvement in the roto market and the interest of other companies in SC paper, could be typical of the confusion in groundwood specialties as long as publication papers remain in oversupply. ☐

Industry prospects, problems for next ten years viewed by expert

Leading industry consultant examines projected growth in demand, supply to 1990, discusses possible solutions to mounting capital cost problems

By JAAKKO PÖYRY

Dr. Pöyry is chairman of the board of Jaakko Pöyry International Oy and affilated companies. This article is from an address to the Survivors' Club annual luncheon, March 8, 1982, Washington, D.C.

☐ In the 1970s, the structure of the paper industry changed considerably. World production increased by about 3% per year, making a total increase during the decade of 45 million metric tons (all tonnages given are metric). This increase came about as follows:

- There were 2195 machines with a total annual capacity of 17 million tons shut down; these shut-down machines had an average capacity of 7750 tpy/machine.
- Some machines were rebuilt, increasing their total capacity by about 20 million tons, or 14,000 tons/machine.
- A total of 924 new paper machines were built, with a combined capacity of about 42 million tpy, and an average capacity of 45,500 tpy.

At the beginning of the 1980s, the number of machines in production around the world, excluding China, was 9120. These machines had an average capacity of

Table 1. **Changes in world paper/paperboard production capacity in the 1970s**

	Number of operating machines	Capacity (million metric tons)
Paper machines, 1981	9266	199.4
Shutdowns, 1971-80	2195	16.7
Major rebuilds, 1971-80	1421	20.2
New machines, 1971-80	945	41.7

Figure 1. **Cumulative changes in world paper production and paper machine capacity**

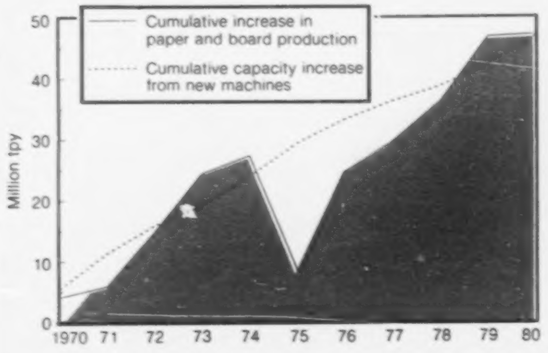
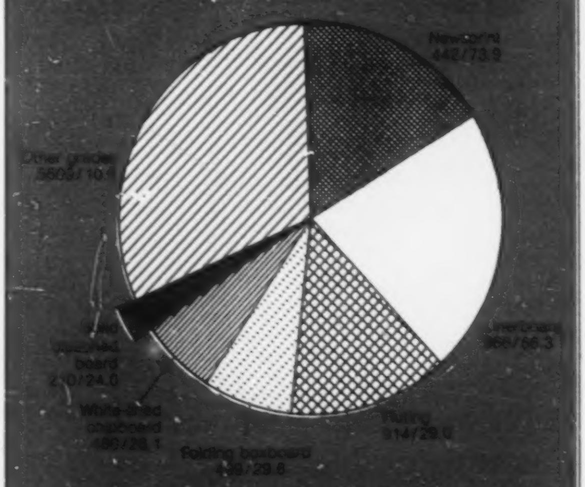
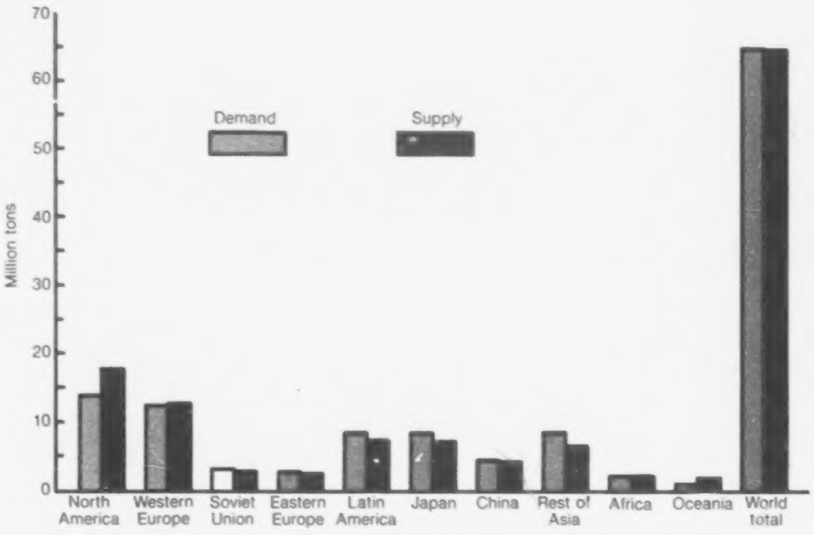


Figure 2. **World distribution of paper and paperboard machine capacity in 1981**



Total world capacity: 195.9 million tpy
number of machines/average capacity (1000 tpy): 9120/21.5

Figure 3. **Paper and board demand and supply growth, 1980-1990, by region**

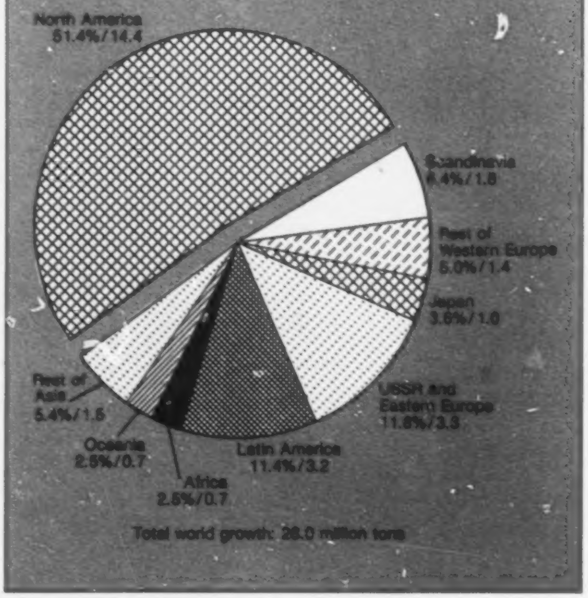


21,500 tpy and an average age of 30 years. Every third machine in operation in 1970 has, since then, either been shut down or rebuilt—not an unhealthy development.

Innovations such as television and computers have not significantly held back paper demand. Thus, it can be anticipated that further developments in electronic media will have only a limited effect on total paper demand.

Paper and nonwoven webs have replaced textiles to some extent. On the other hand, plastics and bulk systems, especially in the packaging industry, have been attacking the market for paper and paperboard. Increased attention has been—and must continue to be—paid to product development through developing converted and combined products. Tetrapak is a good example of a combined product rapidly increasing its market share; by 1985, this product may have doubled its present sales volume. There are similar examples in hygienic tissues.

Figure 4. **Growth of chemical pulp supply in 1980s**



Future demand, capacity

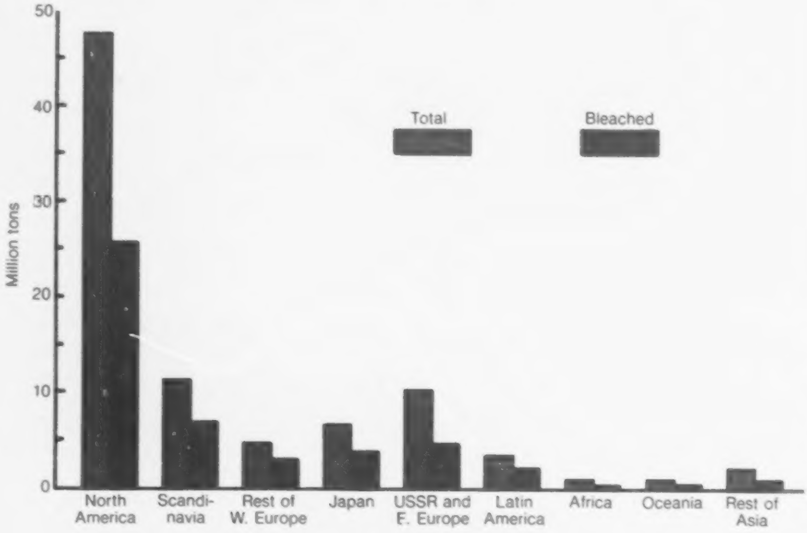
Forecasts for paper and paperboard demand have been adjusted downward. Jaakko Pöyry's recently completed forecast indicates that the increase in annual demand in the 1980s will be about 65 million tons. This is an average increase of 3.3%/year, slightly above that in the 1970s but far below growth in the '50s and '60s. In 1990, total paper demand will be 240 million tons.

In total tonnage and per capita use, North America, Western Europe, and Japan are still in the lead. According to Jaakko Pöyry estimates, annual U.S. consumption will grow from the current 605 lb to 750 lb per capita in 1990. Growth of demand in Third World countries will be most remarkable during the 1980s. This raises the obvious question of how this demand can be met.

Western European demand growth rate will be somewhat greater than in North America, and will most likely be matched by an equal increase in local supply. Joint efforts of EEC countries to finance the modernizations needed in their paper industries will be an essential factor in achieving an increase in paper supply. Western Europe and Japan will become increasingly dependent on imported fiber, mainly in the form of chemical pulp.

The increase required in chemical pulping capacity in the 1980s totals some 40 million tons. Capacity from rebuilds will be 12 million tons, so capacity needed through new mills and major expansions will be about 28 million tons. This new capacity will be built mainly in North America and Third World countries.

Figure 5. **Production of chemical pulp by region in 1979**



World totals (million tons): Pulp = 87.0; Bleached pulp = 47.2

With technology available today, it is possible to build a pulp mill which does not cause environmental problems. Pulp and paper machine suppliers have sufficient capacity to meet future needs, as do engineering consultants and contractors. Nor will human resources be a major constraint, although educational/social problems can be expected in regions without industrial traditions.

Trends in mill investment costs

Investment is the key issue and key problem in deciding whether to build a new mill. Inflation, interest rates, and taxes all affect investment cost. Costs of raw materials, energy, and labor, together with capital charges on the investment, determine whether a new investment will be profitable at a particular price level.

Individual companies embarking on a project cannot influence most of these cost factors, but they can control the investment itself, within its technological limits. The trend of growing investment costs must be broken.

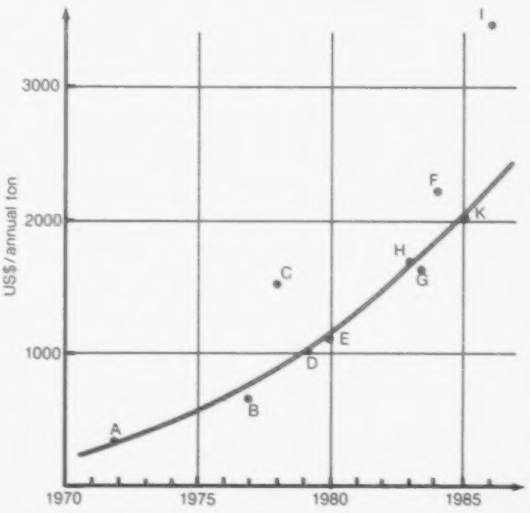
The investment cost of pulp mills that started up in the early 1970s was about US$350/ton of annual capacity. By the late 1970s, the unit investment cost had risen to US$850. In the case of a big Brazilian mill started up in 1978, the investment of US$1500/ton of annual capacity, including the infrastructure, was astronomical. But current investment cost estimates are US$1800 to $2000/annual ton of capacity in the industrialized countries, and up to US$3000 to $3500/ton in developing countries. Rising costs mean that the price of long-fiber pulp should now be about US$750 to $775/ton c.i.f. Rotterdam, to make new capacity profitable. In 1985, the price required will be about US$850 to $900/ton.

Only market forces will decide what the prices will be. Since mills and companies around the world have very different capital and cost structures, it is difficult to believe that pulp prices could reach these figures, except in an exceptional boom year. Regardless, new ways must be found to decrease the investment cost.

Modernizing old mills—and increasing their capacity—could give considerable savings, at least in the medium term. For example, modernization of a Swedish pulp mill, now under way, will increase its production from 240,000 to 280,000 tpy. Operating costs will decrease by US$75/ton, mainly due to reduced labor costs and better energy economy. Annual profit after depreciation will improve by almost US$20 million, with investment per ton of annual capacity only US$680.

Another pulp mill is being modernized to increase

Figure 6. **Trend in investment costs, bleached kraft market pulp mills**



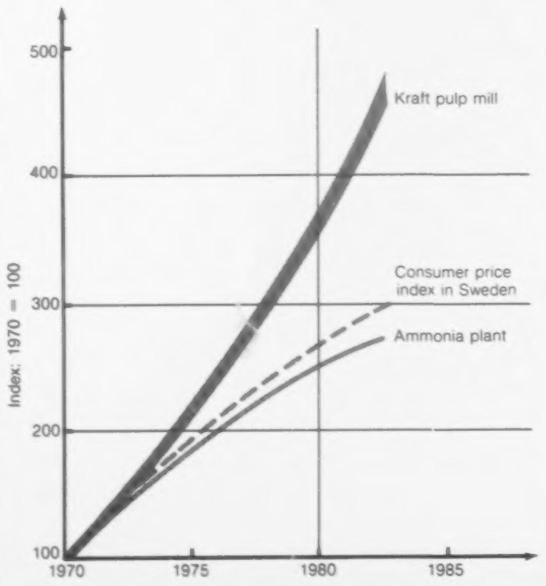
production from 100,000 to 300,000 tpy, the investment being about US$1000/ton of new annual capacity. Operating costs will be almost as low as that of a new mill.

Although modernizing old mills and adding new capacity at the same time is a sensible approach, it will hardly be enough to cover the increased demand for chemical pulp. It is time to allocate more money and resources to the development of the process itself. And one process development that is particularly needed now is a simpler and cheaper recovery process—a widely recognized need. A better recovery process represents probably the biggest saving potential in process development.

Improving project implementation

In the chemical industry, which is similar to the chemical pulp industry, capital costs increases have been kept to a reasonable level. This is only partly due to the chemical industry's faster technical development; it is due mainly to better control of big construction projects.

Figure 7. **Trend in investment requirements, kraft pulp mill vs ammonia plant**



Basic engineering involved in studying the feasibility of a project is relatively limited, and is aimed at estimating capital costs. After the go-ahead decision is made, engineering aims at the earliest possible purchase of main equipment. Delivery time of the main equipment fixes the whole project implementation time schedule. In the limited time available, there is insufficient time to evaluate alternative processes or to prepare enough detailed documents to request fixed-price offers for construction and installation. Under this routine, detailed engineering is effectively tailor-made for each project.

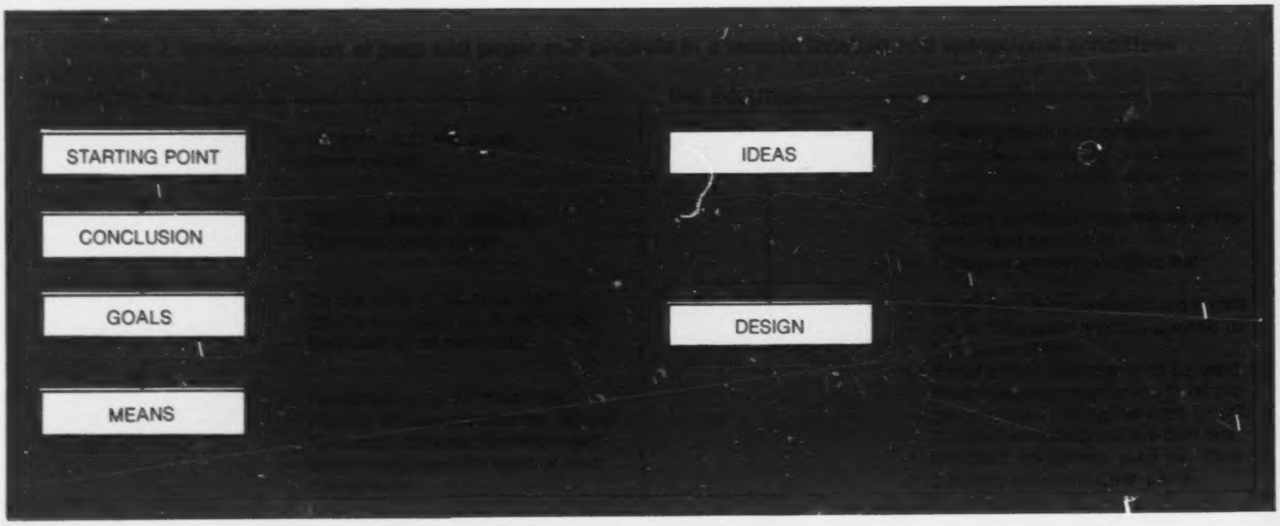
In conventional project implementation, there are several interrelated decisions, with the consequent risk of delays or serious confusion, if even one important decision is not made in time. Inaccuracy in material specifications may also cause delays and cost overruns.

Project implementation can be improved. The engineering firm should be selected well before the go-ahead. Enough time should be allotted for evaluating alternative processes and construction methods, for detailed engineering, and for preparing detailed documents. Fixed-price bids for equipment, construction, and installation can be sought as soon as detailed and accurate specifications are available. With turnkey contracts, competition is possible only if based on such specifications.

Benefits of this approch are: (1) lower equipment, construction, installation, piping and other costs, if bids are based on detailed, accurate documents; (2) lower interest costs because of a shorter period between purchase of equipment and startup; and (3) improved budget control, with earlier warning of possible cost overruns.

It can be argued that the total time to implement a project would be increased with longer basic and detailed engineering. But if engineering is started at the same time as negotiations on financing and environmental permits, total implementation time hardly increases. However, if a negative decision has to be taken for financial or other reasons, the cost of engineering still has to be paid.

In the Japanese paper industry, equipment suppliers' delivery times are extremely short, as are project implementation times. Obviously, the Japanese have a good planning system. They apply more standardization and,



more importantly, do much of the project work in advance, before final go-ahead and before equipment orders are placed.

Placing the blame

Who is to blame for current inefficient and costly planning and implementation practices, so different from, for instance, those in the dynamic and successful chemical industries? There are basically three different culprits—investors, financers, and engineering firms.

Investors have not fully realized the importance and time required for engineering. The same planning procedures suitable for rebuilding existing mills are used in big projects. When the decision to go ahead with a US$500- to $600-million project is made, one would expect its implementation would be entrusted only to a specialized organization. However, this is often not the case. There are even big companies which consider it a question of honor to handle projects on their own, keeping quiet about budget overruns and troublesome startups.

Financers have not demanded more accurate plans, trusting instead in the experience of forest industry companies. Yet these companies may be quite inexperienced in handling big projects with large inputs from outside services.

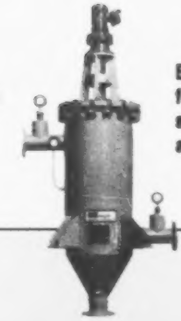
Engineering firms have not been able to develop lower-cost systems and prepare general plans for various climatic and other mill conditions; instead they tailor the engineering to each individual project.

Thus far, Jaakko Pöyry's group of companies has had the opportunity to study the type of approach outlined here in one case only. This was a pulp mill project in a region with a harsh climate and little infrastructure.

In tropical and arctic areas, project implementation times are prolonged several years by difficult construction conditions. Construction time may be restricted to a few months per year by heavy rainfall or cold winters.

In identifying problems involved in reducing investment costs, various ideas are analyzed and the best design principles found. In the case of this pulp mill, the answer was maximized prefabrication. rapid construction of a working environment for starting installation, and standardized transport systems. As a result, construction time was cut by 25%, and mill site work by about 30%.

Some of these ideas can be applied elsewhere. Different climatic or other features would naturally lead to different approaches. However, by taking a fresh look at these problems, some positive action is taken toward building better-planned, lower-cost forest industry units, provided proper time is given for the planning phase. ☐



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Sodium hydrosulfite demand slows, but will pick up

By BARRY SHOCKETT

A combination of the recession and a world-wide surplus of sodium hydrosulfite ($Na_2S_2O_4$) is causing a slowdown in the U.S. $Na_2S_2O_4$ market. Exports dropped to less than 16,000 tons in 1981, and helped reduce the industry operating rate to 93% vs 97% in 1980.

All of the hydrosulfite used in Canada is imported except for Borol, which is produced on-site. (The precursor is also imported). Paper industry use dominates the Canadian market, and overall demand and paper industry use rose slightly in 1981.

U.S. statistics for sodium hydrosulfite* (000 short tons)

	1978	1979	1980	1981e
Nameplate capacity	65	70	75	76
Production	59.4	68	73	71
Shipments	57.2	68.3	73	n.a.
Imports	—	—	0.1	0.4
Exports	12.1	13.9	18.1	15.6
Apparent consumption	45.1	54.4	55	55.8
Pulp and paper	13.5	16.3	16.5	16.7
Textiles	18	21.8	22	22.3

*Not including on-site production via Borol
Sources: Bureau of Census, industry estimates.

Canadian statistics for sodium hydrosulfite* (000 tons)

	1978	1979	1980	1981e
Production	—	—	—	—
Imports	11.2	10.8	10.5	11.6
Total demand	11.2	10.5	10.8	11.6
Pulp and paper	9.9	8.8	9.5	10.2

*Excluding on-site production via Borol

SODIUM HYDROSULFITE

UNITED STATES

Uses: Sodium hydrosulfite is used to bleach mechanical/deinked pulps. The textile industry is the largest end-user (vat dyeing cotton). Others include clay refining and specialty chemicals.

Demand: The paper industry used 16,700 tons (30%) of sodium hydrosulfite for pulp bleaching (excluding on-site production) in 1981. Total consumption was 56,000 tons, with textile applications using about 22,500 tons or 40%. Imports are not a major market factor, with less than 500 tons imported last year. With an estimated 8000 tons (100% basis) produced from Borol, the paper industry consumed almost 25,000 tons.

Exports in 1981 were down almost 14% from the 18,000 tons that were exported in 1980. This reversed the upward trend in exports since 1978.

Sources: Virginia Chemical, the largest supplier, acquired Royce Chemical (the number-three firm) late in 1981. There are now only two producers, the other being Olin. Thiokol's Ventron Div. is the sole U.S. supplier of Borol.

Availability: $Na_2S_2O_4$ plants have operated at an average 95% since 1978. If exports increased faster than domestic demand, capacity expansions would be required. However, no problems of supply are foreseen for U.S. consumers. 1981, market; 1980, market; 1979, market; 1978, market.

Pricing: The last price change for sodium hydrosulfite was in Dec. 1, 1981, when the price of proprietary blend, f.o.b. producing point, rose 2.5¢/lb to 60¢/lb. A similar increase is forecast for mid-year. Pricing history: 1981, 55¢-60¢/lb; 1980, 43.5¢-55¢/lb; 1979, 41/5¢-43/5¢/lb; 1978, 39.5¢-41.5¢/lb.

Forecast: U.S. demand for sodium hydrosulfite will probably be flat in the first half of 1982 but should pick up late in the late third, or early fourth quarter. Overall 1982 demand should parallel 1981, but it depends on the overall economy. Paper industry use could increase from 1981.

CANADA

Uses: Sodium hydrosulfite is mainly utilized by newsprint and some groundwood specialty mills. It is used as a bleaching agent.

Demand: In 1981, Canadian paper mills consumed 10,200 tons of merchant grade sodium hydrosulfite and an estimated 8500 tons of Borol. Total merchant demand was about 11,600 tons; thus, the paper industry dominated the market, using 88%. In 1980, total merchant demand was 10,800 tons, with pulp bleaching accounting for 9500 tons. An estimated 7880 tons of Borol were consumed in 1980. The textile industry used the remaining 12% of merchant grade for vat dyeing of cotton.

Sources: There are no domestic producers. VirChem imports from the U.S. and many distributors import from Europe and Japan. Borol solution is imported from Thiokol Corp.'s Ventron Div.

Availability: No shortages are foreseen due to the small size of the Canadian market. Blended hydrosulfite: 1981, market; 1980, market; 1979, market.

Pricing: Following an 8% price hike in 1981, blended sodium hydrosulfite rose 5.4¢/lb on Jan. 1, 1982 to 69.4¢/lb, delivered in eastern Canada. Nonblended $Na_2S_2O_4$ dropped from 71.5¢/lb to about 61¢/lb in late 1981 under pressure from European imports. Pricing history: Blended, 1981, 59¢-64¢/lb; 1980, 51.4¢/lb; 1979, 50.5¢/lb. Nonblended: 1981, 66.4¢-71.5¢-61.2¢/lb; 1980, 56¢-66.4¢/lb; 1979, 47.5¢-56¢/lb.

Forecast: Newsprint mill downtime in 1982 is expected to reduce consumption of merchant hydrosulfite by about 10%. Demand should pick up again and grow 8%-10%/year until the mid-1980s. Borol use should increase about 10% in 1982 due to the start up of several on-site facilities in both eastern and western Canadian paper mills.

Mr. Shockett is consulting editor-chemical markets for PULP & PAPER.

PULP & PAPER

June 1982

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Issue focus:

Mechanical pulping

Pulpwood processing

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PULP & PAPER

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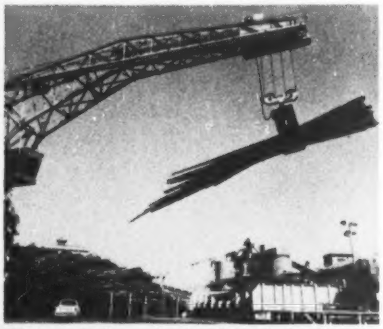

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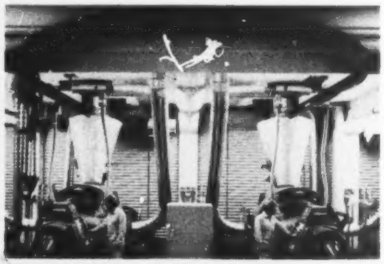

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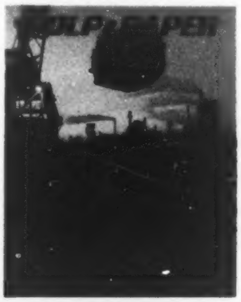

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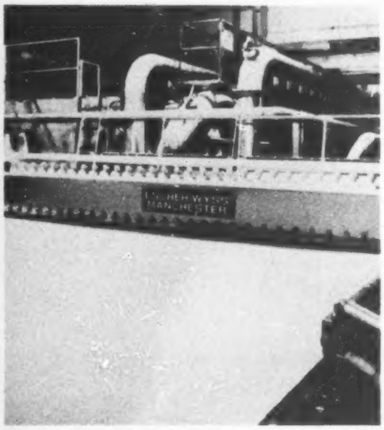

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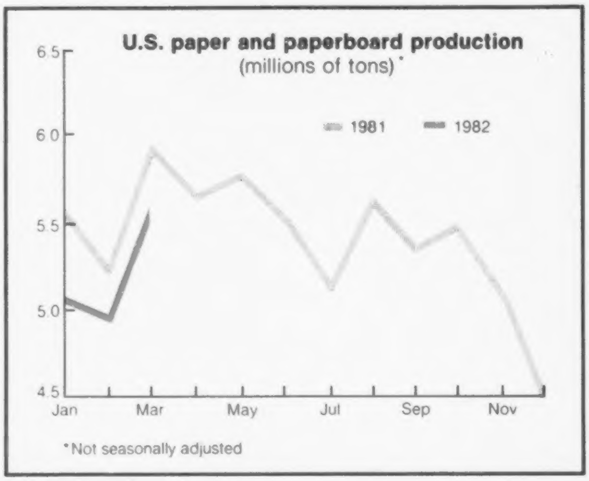
MONTH IN STATISTICS

U.S. paper and paperboard production in March totaled 5.6 million short tons, about 4% below March 1981 levels, according to the American Paper Institute. Adjusted for seasonal and workday factors, the average rate of production for the first quarter of 1982 was about 61 million tpy, 3.5% below the cyclical peak reached in the first quarter of 1981, but 1% above fourth-quarter 1981.

Among major grades, newsprint production continued to show the only strength, and its 7% gain over year-earlier levels for the quarter was offset by modest declines in the other paper grades. Also for the quarter, printing/writing paper production was 2.6% below its year-ago total, tissue was off 1.8%, and packaging papers down about 1%. Paperboard output in the quarter was down 6.4% from its year-ago level, with an 8% decline in containerboard, a 5.5% decline in boxboard for domestic use, and a 7% fall-off for folding boxboard.

Total Canadian newsprint shipments in March came to 749,000 metric tons, down 2.7% from a year earlier, according to the Canadian Pulp & Paper Assn. Newsprint mill operating rates were 91% vs 98% a year earlier.


U.S. paper and paperboard production
(millions of tons)*

*Not seasonally adjusted

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	March	466	6.2	5,358	7.2
Uncoated groundwood (s)	March	127	4.1	1,382	−5.1
Coated paper (s)	March	432	−1.4	4,901	−2.3
Uncoated free sheet (s)	March	671	−5.8	7,795	−2.5
Unbleached kraft packaging and industrial (s)	March	343	−5.2	3,912	−4.2
Tissue	March	385	−2.5	4,419	−1.8
Total paper	**March**	**2,714**	**−1.3**	**31,041**	**−0.6**
Kraft linerboard, unbleached	March	1,272	−2.6	13,945	−6.2
Semichemical medium	March	395	−8.1	4,488	−8.6
Bleached paperboard	March	333	−9.5	3,769	−7.7
Recycled paperboard	March	615	−3.9	6,946	−6.0
Total paperboard	**March**	**2,716**	**−4.4**	**30,277**	**−6.4**
Total paper and paperboard*	**March**	**5,578**	**−3.9**	**62,966**	**−4.5**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	February	4,188	1.5	49,498	−3.2
Market pulp production	February	533	5.8	5,743	−6.2
Wastepaper consumption at paper/board mills	February	1,221	0.8	14,634	−5.2
Pulpwood consumption (cords)	February	6,509	−2.9	77,430	−2.1
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	March	21.218	−2.0	58.858†	−6.2
Containerboard inventories at box plants	Mar. 1	2,468	21.6		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	February	611	−12.7	7,720	−7.0
Imports of Canadian newsprint	February	524	−15.3	6,633†	−5.4
U.S. paper exports (including products)	February	322	−11.0	3,788	−14.9
Exports of unbleached kraft linerboard	March	180	0.6	1,906	5.2
Exports of woodpulp	February	303	8.6	3,143	−8.2
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	March	749	−2.7	2,129†	−1.0
Operating rates	March	91%	98%	94%	97%
Inventories held by U.S. consumers	Mar. 31	1,669	29.8		
Woodpulp shipments (export only)	March	n.a.	n.a.	n.a.†	n.a.
Operating rates	March	n.a.%	n.a.%	n.a.%	n.a.%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn.
*Includes construction and wet machine grades. †Not annualized. ‡Not directly comparable to year ago because of coding change. (s) = shipments.

FINANCE

U.S. paper profits plummet in first quarter

U.S. pulp and paper companies reported dismal earnings for the first quarter of 1982 as persistently depressed markets cut into profit margins and price structures weakened. Pulp and paper companies saw earnings fall 42.3% below year-earlier levels on a 2.0% decline in sales, according to a PULP & PAPER survey of 27 firms. First-quarter after-tax profit margins fell to 3.8% from 6.3% in the first quarter of 1981.

An even blacker picture was painted by seven more companies with large forest product holdings, who reported earnings down 59.3% on a 9.3% decline in sales. First-quarter earnings for the total paper/forest products industry dropped 47.1%.

IP profits tumble. International Paper Co. reported earnings down 59.3% to $60 million in the first quarter. The company's 1982 results included an after-tax gain of $17.2 million from the sale of tax benefits, while 1981 results included a $57-million gain from major land transactions.

Well over three-fourths of the paper companies for which results were available reported earnings below year-earlier levels or actual losses. Crown Zellerbach Corp. posted an earnings decline of 69.6%, attributable primarily to the depressed housing industry but also due to the poor performance of Crown Zellerbach Canada, which reported a substantial loss for the quarter. Mead Corp., reporting an earnings falloff of 54.0%, saw weakened demand in paper, paperboard, and pulp areas reduce prices and profit margins. St. Regis Paper Co., with earnings down 61.0%, also cited nonrecurring factors. Union Camp reported a 19.4% decline in profits in the quarter, with shipments of paper products down 9% from a year earlier.

Among the few bright spots, Great Northern Nekoosa Corp. saw profits rise 3.8%, helped by a substantial increase in the investment tax credit related to its new pulp mill near Hattiesburg, Miss. Federal Paper Board Co. said a lower tax rate for the quarter helped push profits up 8.1%, and Fort Howard Paper Co. reported a record first quarter, aided by lower fiber costs, with profits up 10.2%.

Dismal wood products. Companies most heavily involved in wood products continued to be hardest hit in what is seen as the longest depression in homebuilding since World War II.

Boise Cascade Corp.'s profits fell 85.2% due to the housing slump and softening in paper markets, which resulted in downtime at some of its mills. Champion International saw profits tumble 97.8%, despite an increase in operating income from its paper operations. And Georgia-Pacific Corp.'s earnings fell 51.9%. Weyerhaeuser Co., in comparison, reported earnings almost even with a year ago. And Pope & Talbot Inc., helped by profitable pulp and paper operations and increased cutting of low-cost fee timber, posted earnings up 39.3%.

Canadian profits nose dive. Weakened demand for newsprint and kraft pulp, combined with the effects of the depressed housing market, caused Canadian pulp and paper company first-quarter profits to plummet from year-earlier levels, according to reports in from ten major producers. Earnings were down 87% on a 9% decline in sales, bringing profit margins to 0.7%, compared with 4.9% in first-quarter 1981.

Five companies reported actual losses for the quarter, while all but one of the remainder posted profit declines.

U.S. PAPER/FOREST PRODUCTS RESULTS

First quarter ($000)

Paper companies	**Sales**	**Change 1982/81**	**Earnings[1]**	**Change 1982/81**
Chesapeake	$59,600	−6.6%	$1,900	−67.8%
Clevepak	31,079	5.9	949	0.1
Consolidated	135,816	−1.1	10,905	−29.7
Crown Zellerbach	725,000	−5.3	5,600	−69.6
Diamond	264,979	−14.4	2,204	−73.1
Federal Paper	123,015	8.0[2]	5,348	8.1[2]
Fort Howard	120,295	8.4	21,803	10.2
Glatfelter	68,696	29.3	5,774	150.7
GN Nekoosa	367,900	0.5	22,000	3.8
Hammermill	325,916	5.7	7,080	−34.1
Intl. Paper	1,002,700	−23.2	60,000[3]	−59.3
James River (1/24)[4]	184,250	−1.6	4,391	−5.9
Kimberly-Clark	734,300	0.1	57,700	−4.2
Longview (1/31)[4]	92,912	11.0	(2,185)	n.m.
Mead	689,866	2.6	13,803	−54.0
Mosinee	22,021	−6.1	1,022	−41.6
Pentair	67,865	17.0	2,223	−19.5
St. Regis	672,230	−9.8	19,430	−61.0
Scott	580,156	2.5[2]	18,639	−27.9[2]
Sonoco	122,953	−4.2[2]	6,667	−13.8[2]
Sorg	19,932	−8.8	(98)	n.m.
SW Forest	144,948	−27.6	(4.603)	n.m.
Stone Container	105,442	2.3	2,556	−58.6
Union Camp	372,433	−10.6	32,241	−19.4
Wausau (2/28)[4]	44,833	−5.6	(864)	n.m.
Westvaco	342,644	−5.4	8,323	−57.4
Willamette	214,305	−12.2	(4,652)	n.m.
Total	**7,906,086**	**−3.1**	**298,156**	**−42.3**
Forest Products				
Boise Cascade	713,960	−9.0	5,560	−85.2
Champion Intl.	905,913	−9.5	617	−97.8
Georgia-Pacific	1,199,000	−11.1	25,000	−51.9
Louis.-Pacific	196,570	−26.4	(11,750)	n.m.
Pope & Talbot	59,633	−4.0	857	39.3
Potlatch	201,308	−7.9	4,485	−43.6
Weyerhaeuser	1,057,457	−3.7	56,952	−0.1
Total	**4,333,841**	**−9.3**	**81,721**	**−59.3**
U.S. total	**12,239,927**	**−5.4**	**379,877**	**−47.1**

CANADIAN PAPER INDUSTRY RESULTS

Abitibi	C$414,618	0.9%	C$22,019	−21.5%
B.C. Forest	198,300	−2.9	(4,700)	n.m.
B.C. Resources	143,200	−35.9	(13,000)	n.m.
Con-Bathurst	362,600	1.6	17,600	−32.8
Doman	30,600	−1.0	(7,700)	n.m.
Fraser	102,734	8.4[2]	143	−97.0[2]
Great Lakes	132,275	−4.7	12,179	−42.0
Mac. Bloedel	505,000	−17.5	(10,400)	n.m.
Scott	52,900	9.3	2,200	10.0
Weldwood	99,700	−23.2	(4,047)	n.m.
Total	**2,041,927**	**−9.2**	**14,294**	**−87.1**

1. Income after taxes, from continuing operations, excluding most significant nonrecurring items in both years.
2. 1981 figures restated by company.
3. 1982 results include after-tax gain of $17.2 million from sale of tax benefits. 1981 results include after-tax gain of $57 million from land transactions.
4. Period ended. Figures for James River are for third quarter, Wausau for second quarter.

n.m. = not meaningful

LABOR

Abitibi workers vote for strike action

Negotiations between the Canadian Paperworkers Union and Abitibi-Price Inc., which broke off Apr. 7, resumed on May 11, the day after the union counted strike votes taken at the 11 Abitibi mills where contracts expired Apr. 30, according to Aurele Ferlatte, secretary-treasurer of CPU. Ferlatte said 74.5% of the Abitibi workers voted in favor of a strike, and that by May 15 there would be a settlement or the union would proceed with strike action.

According to CPU, monetary issues would not be discussed with other companies during labor negotiations in eastern Canada until a salary and benefits settlement was reached with Abitibi. CPU, which represents most pulp and paper workers affected by this year's bargaining in eastern Canada, made the announcement when the union refused to respond to the company's offer of an 8% increase in wages with a minimum of C$1.00 the first year and a 7½%-increase in the final year of a two-year contract. The union is willing to settle for 15%/13%, said Ferlatte, which would equal the increase achieved by western Canadian paperworkers last year but would keep some differential between wage rates in the East and West.

- **Glatfelter to shut down.** Operations at P.H. Glatfelter Co.'s 225-tpd fine papers mill in West Carrollton, Ohio, were shut down by the company on Apr. 11 because of an expired labor contract with about 250 of the mill's workers who are members of United Paperworkers International Union. The three-year contract, which ran out on Apr. 5, allowed the company to temporarily close the mill if the contract lapsed. Negotiations are continuing, a mill executive said.
- **American Can pact.** American Can Co. reached a three-year settlement with 463 UPIU members at its Halsey, Ore., toweling/tissue mill. The new contract, which runs from Feb. 1, 1982 through Jan. 31, 1985, provides for wage increases of 9%/7.63%/6.7% over the three years, averaging out to 97.5¢ more the first year, 90¢ more the second year and 85¢ more the third year, in addition to improved benefits.

IWA turns down any concessions

Give-backs in current or future labor contracts in response to management requests for relief from rising labor costs were ruled out at a recent conference of the International Woodworkers of America in Portland, Ore. That hasn't kept forest products employer groups in British Columbia, however, from continuing to seek wage and other concessions from the IWA and other unions, observers said.

A British Columbia forest products employers group called Interior Forest Labor Relations Ltd. has publicly asked the IWA and Canadian Paperworkers Union to defer a 13% wage increase to take effect for IWA members on June 15 and for CPU workers on July 1.

Forest Industrial Relations Ltd. and Pulp & Paper Industrial Relations Bureau, two larger B.C. forest products employer groups, have talked to the union about the industry's losses but have not asked for any specific concessions, according to an executive at one of the employers groups.

Fourth-quarter mill wages drop

Paper mill employees were paid less at the end of the fourth quarter than at the conclusion of the third quarter and there were fewer of them around to collect paychecks as well, Bureau of Labor Statistics figures showed.

Production worker employment in the paper and allied products industry group fell by 1.9% between December 1980 and December 1981, to 511,000 workers, and preliminary figures indicate January was another 0.4% below December. Employment for the year peaked in September at 531,000.

Employment of female workers—nonproduction as well as production—also peaked in September, reaching 165,000 workers, but in November had fallen to 159,000 employees, a point identical to November 1980 figures. Year-end numbers were not yet available.

Wages were eroded by a drop in weekly hours and overtime which in some cases became acute during the fourth quarter. Average hourly earnings for the whole industry rose slightly in the fourth period but the drop in hours cut weekly earnings by 0.9%, while weekly earnings in pulp and paper mills alone ended the quarter 6.9% lower than in September. In the case of that segment of the industry group, hourly earnings actually fell by 1.2%, although remaining well above December 1980 levels.

Average earnings and hours of production workers in the paper and allied products industry

	Dec. 1981	Sept. 1981	% change for quarter	Dec. 1980	% change year ago
Paper & allied (SIC 26)					
Hourly earnings	$8.96	$8.92	0.4%	$8.27	8.3%
Weekly hours	42.7	43.3	−1.4	43.7	−2.3
Overtime hours	4.2	5.4	−22.2	4.9	−14.3
Weekly earnings	382.59	386.24	−0.9	361.40	5.9
Pulp & paper mills*					
Hourly earnings	$10.43	$10.56	−1.2%	$9.01	15.8%
Weekly hours	44.4	47.1	−5.7	45.3	−2.0
Overtime hours	5.6	8.5	−34.1	6.6	−15.2
Weekly earnings	463.09	497.38	−6.9	435.33	6.4
Paperboard containers & boxes					
Hourly earnings	$7.84	$7.65	2.5%	$7.30	7.4%
Weekly hours	41.3	41.2	0.2	43.4	−4.8
Overtime hours	3.1	3.6	−13.9	4.0	−22.5
Weekly earnings	323.79	315.18	2.7	316.82	2.2

*Does not include figures for paperboard mills, which are similar.
Source: Dept. of Labor, Bureau of Labor Statistics.

DOWNTIME

K-C Terrace Bay mill back on-line

Kimberly-Clark of Canada Ltd.'s Terrace Bay, Ont., pulp mill is back on-line again following a fire in the No. 3 digester area that shut down the facility Oct. 30 (P&P, Jan., p. 27). The mill started up in two stages, with one portion resuming operations Mar. 13 and the second part starting up Mar. 19. Production is still nowhere near the mill's 1250-tpd capacity, with output ranging from 700 to 900 tpd most days.

Corrugating medium: Lower box production, inventory cuts hurt demand

Statistics:	**1980**	**1981**	**1982**
Production, 000 tons			
Semichemical[1]	4723	4717	4510
Recycled[2]	1281	1319	1190
Total	6004	6036	5700
Capacity, 000 tons			
Semichemical	4946	4952	5180
Recycled	1330	1332	1385
Utilization rates, %			
Semichemical	95.5	95.3	87.1
Recycled	96.3	99.0	85.9
Imports, 000 tons[1]	31	52	30
Exports, 000 tons[2]	322	140	160
Apparent U.S. consumption			
000 tons	5713	5948	5570
lb/capita	50.2	51.8	48.1
000 tons/$billion real GNP (1972)	3.85	3.94	3.75

[1] API data [2] Bureau of Census data

Grade structure: Corrugating medium includes paperboard made from both semichemical pulp and recycled fiber. In 1981, 78% was made from semichemical pulp furnish (which normally contains at least 20% recycled fiber), and 22% was "bogus" medium, made from recycled fiber. Basis weights of corrugating medium are 22, 26, 33, and 36 lb/1000 ft². Standard sheet weight is 26 lb, which accounts for more than 80%. Bogus for equivalent uses is normally produced in slightly higher weights.

Production/capacity: In 1981, production of corrugating medium increased 0.5% over the 1980 level, with semichemical virtually flat and recycled medium up 3.0%, reflecting tight market conditions earlier in the year before box production began to fall off in fourth quarter. Operating rates were also helped by 177,000 tons of inventory building in 1981, which left year-end box plant/mill stocks at a record 704,000 tons.

Capacity for corrugating medium is expected to increase by 4.5% in 1982, 4.9% in 1983, and 2.4% in 1984. Most of the 715,000 tons of new capacity is expected to be in semichemical medium, while recycled capacity remains relatively flat. International Paper Co. started up a 270,000-tpy semichemical medium machine at its new Mansfield, La., mill at the end of 1981, and a 210,000-tpy machine is scheduled to come on line at MacMillan Bloedel's Pine Hill, Ala., mill in 1983.

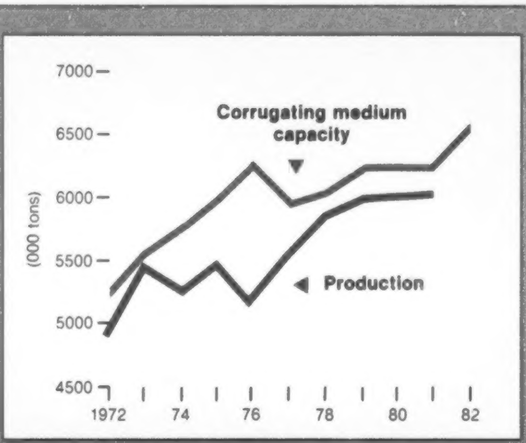
Outlook: In 1982, total demand for corrugating medium is expected to total 5.7 million tons, down 5.2% from 1981. This is based on a projected 2.3% decline in corrugated container production, which indicates requirements for corrugating medium of about 5.4 million tons. Estimated exports of 160,000 tons and other noncontainer uses of around 240,000 tons are expected to consume another 400,000 tons, offsetting about 100,000 tons of inventory reduction.

Recycled is expected to suffer more than twice the drop of semichemical medium production in this year's soft market.

Pricing: Last $30/ton price increase for 26-lb semichemical medium to $290/ton took place at the beginning of 1981, but rebating in the industry took the price back down to $260 in December/January and back again to that level in May—and possibly into the seasonally weak summer months.

Pricing history of 26-lb semichemical medium in the East is as follows: 1970, $110/short ton; 1971, $120; 1972, $120; 1973, $135; 1974, $185; 1975, $190; 1976, $195; 1977, $185/195; 1978, $210; 1979, $260; 1980, $260; 1981, $290 (list; $260 effective). West Coast prices have been $4.25/ton higher—and since second-quarter 1980, $34.25 higher—due to a sharp rise in woodchip costs.

Semichemical medium is priced $10/ton less than 42-lb kraft linerboard (except on the West Coast) and recycled medium normally sells for about $5 less than semichemical.



Estimated capacities of major U.S. companies are:

	Annual capacity (000 tons)			
	Semi-chemical medium	**Recycled medium**	**Total**	**Capacity share (%)**
1. Owens-Illinois	580	—	580	8.8%
2. Weyerhaeuser	575	—	575	8.7
3. International Paper	485	—	485	7.4
4. Container Corp. of America	235	155	390	5.9
5. Inland Container	175	210	385	5.9
6. Champion Intl.	200	120	320	4.9
7. Willamette Indus.	240	65	305	4.6
8. Mead	300	—	300	4.6
9. Packaging Corp. of America	254	—	254	3.9
10. Stone Container	247	—	247	3.8
11. Virginia Fibre	208	—	208	3.2
12. Smurfit Ind. (Alton Pkging)	—	200	200	3.0
13. St. Regis Paper	63*	132	195	3.0
14. Great Southern	176	—	195	3.0
15. Weston Paper Mfg.	135	—	135	2.1

U.S. capacity (1982): **6.585 million tons**
Capacity share of top five companies: 36.8%
Capacity share of top ten companies: 58.5%

*St. Regis interest in joint-venture machine with Sonoco Products Co.

Return-on-investment must improve to stimulate Southern tree growing

Forestry expert discusses the trends in growth, planting, and land ownership in the South, and describes methods for improving forest productivity

By KENNETH E. SMITH, Senior Editor

☐ Forest industry experts agree that timber demand in the U.S. will increase dramatically by the end of this century. The U.S. Forest Service predicts that domestic demand for products made from wood will double in the next fifty years. Meanwhile, foreign demand is growing, as Canadian and Scandinavian forests reach the limit of their productive capacity.

The U.S. South is increasingly seen as the most promising area of the world for increased timber production. Approximately 40% of the nation's commercial timberland is in the South. The growth-to-harvest cycle for Southern pine may be as short as 30 years, compared with a 50- to 60-year span for softwoods elsewhere. However, about 72% of that land is owned by private individuals and is not as productive as industry-owned, intensely managed land. Clearly, this privately owned land is the key to meeting future demands for softwood lumber and pulp (see Figures 1 through 4).

To gain a better understanding of the potential of Southern forests and how that potential can be improved, PULP & PAPER interviewed Dr. William R. Sizemore of Sizemore & Sizemore, a Tallassee, Ala.-based company offering forestry appraisal, analysis, and management throughout the U.S.

Figure 1. **Total U.S. timber demand, 1976-2030**

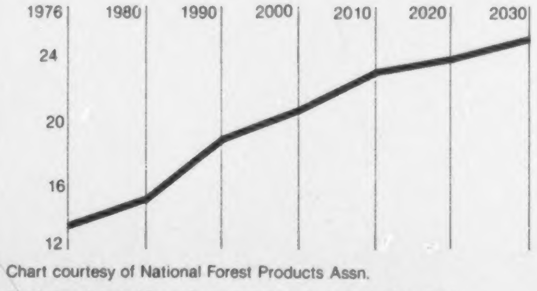


Chart courtesy of National Forest Products Assn.

*Includes demand for softwood and hardwood growing stock (sawtimber and pulpwood)

Dr. Sizemore received a B.S. degree in forestry from La. State Univ., a master of forestry from Duke Univ., and a PhD from the Univ. of Ga. He is a registered forester in 12 states and a registered land surveyor in Ala. and Fla. He has held appointments as adjunct professor of forestry at Auburn Univ. and as lecturer at Duke Univ. He is now an adjunct professor of forestry at Duke.

P&P: *Dr. Sizemore, what is the current annual production of Southern forests? What could that production be by the year 2000? What is it likely to be if current trends continue? What is the current ratio of growth to cut in the South?*

Sizemore In 1977, the growing stock inventory for Southern forests, both softwood and hardwood, was 230,037-million ft^3. In 1976, roundwood production from growing stock for both species groups in the South was 5511-million ft^3. Predicted roundwood production for both species groups for the year 2000 is 8060-million ft^3.

If there is a continuation in current trends of timber production, net annual growth of softwood trees will rise until it peaks in 2010. Failure to maintain an adequate flow of small dia softwoods into larger-size classes will be a major contributing factor in this growth peak.

The net annual growth of hardwoods will be similar to that of softwoods. Growth will peak in 1990 and will continue to decline until 2030.

If there are any changes in these projected growths, they will not affect projected timber supplies unless there are definite changes in current inventories. The 1976 net annual growth of pine and hardwood in the South was 10,705-million ft^3. The net annual removals for the South in 1976 was 6572-million ft^3. This results in a 1.6:1 ratio of growth to removals for both pine and hardwood.

The situation with respect to softwoods is much less favorable. For example, 54% of the loblolly pine acreage harvested between 1961 and 1972 was not regenerated back to loblolly. This failure created an age-class gap that is giving the forest industry supply problems.

P&P: *Despite a growing demand for forest products, isn't it true that each year much land is lost to commercial timber production? Why isn't this land replanted? Don't the tax breaks available to forest landowners provide enough incentive for them to replant?*

Sizemore When one thinks of land being lost to commercial timber production, the general image is forestland being converted to shopping centers, highways, soybeans, pasture, or other uses. And it's true that this happens every year in every state where there are significant forestlands. The impact is lessened by those lands moving into forestry by default; that is, abandonment of a higher and better use. Nationwide, more acres are going out of commercial forestry than coming in. In some areas, like Miss. and La. bottomlands, the trend is drastic enough to cast a cloud on the future of some wood-using plants.

No incentive exists today—and logically shouldn't—to stop the conversion of forestlands to a clearly higher and better use. What is truly alarming is the reverse movement to the lowest and worse use; that is, just holding the world together. And this is what happens when all of the growing stock is removed from forestlands and nothing is done to restock it.

Tax breaks won't stimulate reforestation; it's going to take one or more technological breakthroughs.

P&P: *Could you give examples?*

Sizemore We need **genetic improvements** permitting the harvest of pulpwood-sized pine in eight years that will command a price/cord at least equal to current rates; a **logging system** that would permit cost-effective harvesting of as little as 10 acres of moderately stocked pine or hardwood; and **a way to grow intolerant trees** (such as southern pine) at acceptable yields in all aged stands; and **harvesting methods** that would avoid damage to residual stands.

There are breakthroughs that we can dream about, but these four have something in common—they would reduce the waiting period between investment and return and provide sufficient return to attract the attention of the financial community. Maybe timber ownership could shed its current capital-intensive, long-horizon image.

P&P: *How much forestland in the South is in plantation?*

Sizemore Commercial forestland in the South totals about 188 million acres. According to the U.S. Forest Service, only 1.3 million acres were planted in the South in 1977, of which 1.1 million acres were industry lands. From 1950 to 1977, 38 million acres were planted nationwide, of which 24 million were planted in the South. Industry plantings in those years totalled 15.2 million acres, or 63%. I know from direct observation that many early plantings have been cut, so I doubt if we have more than 20 million acres of plantation, or about 11% of our commercial forests, remaining in the South.

P&P: *How does the productivity of privately owned timberland compare to that of managed forestland owned by paper companies?*

Sizemore In the answer to an earlier question, I mentioned our long-horizon image. The answer to this question depends on the horizon of reference. If you are talking about M.A.I. (mean annual increment, or the average growth per acre from planting to harvest), the forest products industry is way ahead. If you are talking about current annual increment (that is, the growth for one year), the nonindustrial private owner leads. If the horizon reference is periodic (some period less than the rotation length—say ten years), the two ownership classes are about even. The reason for the differences is that from 25% to 50% of industry's lands are awaiting reforestation or are in young trees not yet having merchantable volume, hence no recognized growth.

P&P: *Do genetic species improvement and fertilization promise to have much effect on future Southern timber production? What about the introduction of new species, like rapidly growing eucalyptus?*

Sizemore Any significant impact of genetically improved trees is at least a half rotation away. This means that significant results are about 15 years away in the South, and 25 years in the Northwest.

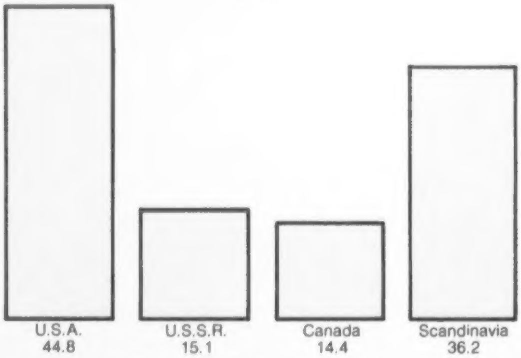
Rapidly growing species do offer some hope. Cottonwood shows promise, but it's a short-fibered species, and the most probable continuing, heavy demand is for long-fibered species. A long-fibered, truly frost-resistant eucalyptus would be a technological breakthrough.

I am familiar with fertilization techniques only in the South. My feeling is that economic feasibility of fertilization is highly site-specific. Thus, economy of scale is an overriding consideration. Costs force us to use a meat axe when we need a scalpel. We're still in the learning stage with nitrogen use, but I think phosphorus used in poorly drained sites is a real winner. If you don't believe it, ask Brunswick Pulp & Paper Co. to show you some of their plots which are approaching pulpwood size.

P&P: *How can Southern private landowners be encouraged to plant more trees and properly manage existing stands? What are the forest products and paper industries doing to encourage more private tree growing?*

Sizemore I'm a private forestland owner myself, and I have never planted any significant acreage of seedlings without government assistance. I did most of my planting under the Conservation Reserve Program of the Soil Bank. If you'll look at the graph of acres planted by year for the nation [see Figure 5], you'll find that the active period of that program is the only significant upward

Figure 2. **Annual growth per acre**
(ft³)



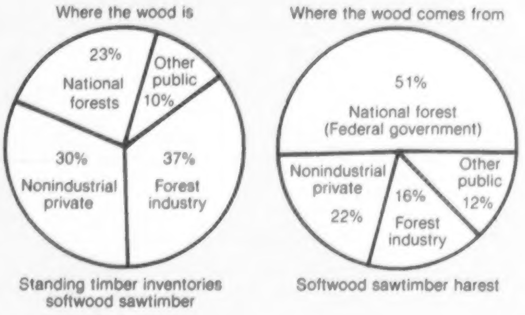
Source: National Forest Products Assn.

bulge in planting activity that we have ever had. It would take that kind of program to pull me back into active planting. I firmly believe and support the intensive forestry that industry is practicing. But, forest products firms have an almost unlimited horizon. I have to look backward to see mine. More than half of the nation's nonindustrial forestlands will be involved in estate proceedings in the next 20 years. I'm not atypical.

By taking advantage of partially stocked natural stands, the current annual growth of my forestland has been above average; and, for the first 28 of 30 years, my periodic annual growth was much above average. If the southern beetle hadn't gotten to me, I'd still be above average. This strongly suggests that "acres planted" is not always the measure of the quality of management.

P&P: *As demand for timber and pulpwood grows, do you see major forest products companies buying/owning the majority of the South's commercial timberland?*
Sizemore Industry ownership could reach 50%, and that would make the answer to your question "yes." However, as long as the success of a firm is measured by current financial standards, it's doubtful that industry ownership will get to that level. It appears that "patient money" is taking a real interest in timberlands, and if that is the case, we may see drastic changes in land ownership patterns. The real motivation for forest industry ownership is stabilization of raw material cost. If the desired stabilization is achieved, investments in timber growing measured by annual cash return turn out to be mediocre. If patient money were to come to dominate timberland ownership, informed sellers would call the tune with respect to prices. Thus, the good news is that the timber would be there; the bad is that prices would be higher.

Figure 3. **Breakdown of standing softwood sawtimber inventories and harvest**



Source: National Forest Products Assn.

Figure 4. **Private nonindustrial lands productivity: wood consumer goals compared with 1980 Resources Planning Act**
(billion ft³) softwood timber

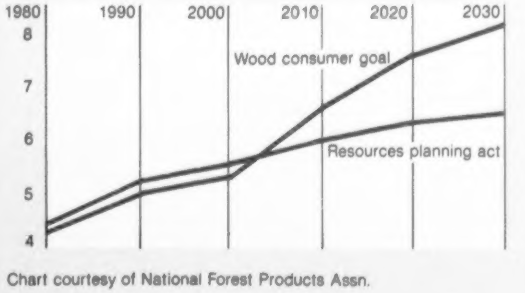


Chart courtesy of National Forest Products Assn.

P&P: *Will the increased use of biomass for fuel in the South have much effect on the price and supply of pulp chips? What about the increasing production of oriented-fiber panels made from pressed chips?*
Sizemore Chips for pulp are currently more valuable than chips for fuel. I can't see energy prices changing this relationship. So far, the oriented-fiber panels require a higher-quality furnish than that for fuel chips. The prospects for using pine chips for panels are still hazy. I personally think that the bugs have not yet been worked out of the use of a multispecies furnish for panels. I hope that the use of odd species and below-grade material for fuel chips continues to grow. Site preparation and planting costs behind biomass operations are significantly cheaper. That means we'll get more trees in the ground.

P&P: *Has the current housing industry slump had a big effect on pulp chip supply and pricing since most pulp chips are byproducts of lumber operations?*
Sizemore The housing industry slump has significantly reduced the supply of chips from lumber operations, both independent and captive. Chips have been generally priced as byproducts. This is why remote chipping plants have not become a major influence in the industry. Pulp plants have not been able to stand full costing of chips. Before the softening in pulp prices and after the downturn in lumber prices, several firms tried running Chip-N-Saws as chip producers only. The result was full costing of chips—an untenable situation for the pulp mills. In many cases, it was cheaper to shut down facilities and buy more roundwood. Many believe that the continuing relatively high level of stumpage prices is a result.

P&P: *What percent of current Southern timber production is pulpwood, chips, plywood, and lumber?*
Sizemore In 1976, pulpwood production (including chips) accounted for 43% of total roundwood production. The lumber industry consumed 40% of the total production and plywood plants used 10%. ☐

Figure 5. **Planting and seeding on private, nonindustrial lands in the U.S., 1952-1980**

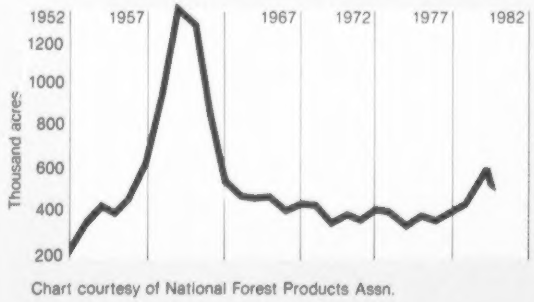


Chart courtesy of National Forest Products Assn.

Effects of tax laws on forest yields—U.S. vs Finnish system

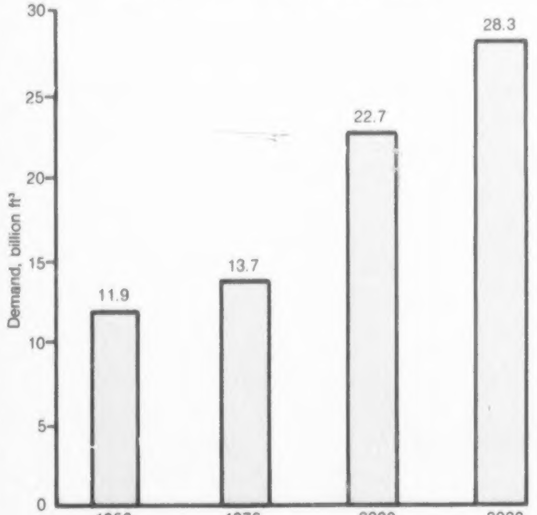
In parts of U.S. (Alabama), tax policies may favor nonmanagement of forestland; in many countries (Finland), taxes penalize lack of management

By ROBERT W. HAGLER

☐ According to a recent General Accounting Office report, the U.S. faces an enormous increase in demand for its wood in the next 50 years (Figure 1). From a 1977 level of 13.7 billion ft^3, demand is projected to reach 22.7 billion ft^3 by the year 2000 and 28.3 billion ft^3 by 2030. If market forces are allowed to bring about a wood supply/demand equilibrium, prices are likely to skyrocket. For example, in the southeast U.S., prices would have to almost quadruple to $526.80/1000 bd ft by 2030 to equalize supply and demand.

Mr. Hagler is a forest products consultant with Arthur D. Little Inc., Cambridge, Mass.

Figure 1. **Demand for U.S. timber**



Source: U.S. Forest Service

On the other hand, if current price trends are assumed, the Forest Service projects a softwood sawtimber shortage of more than 2 billion ft^3 by the year 2030. U.S. wood resources will be further drained by a projected increase in export demand for timber to more than 1.5 billion ft^3 by the year 2000. Tight domestic supplies could have a dampening effect on future exports at a time when the U.S. will already have a trade deficit.

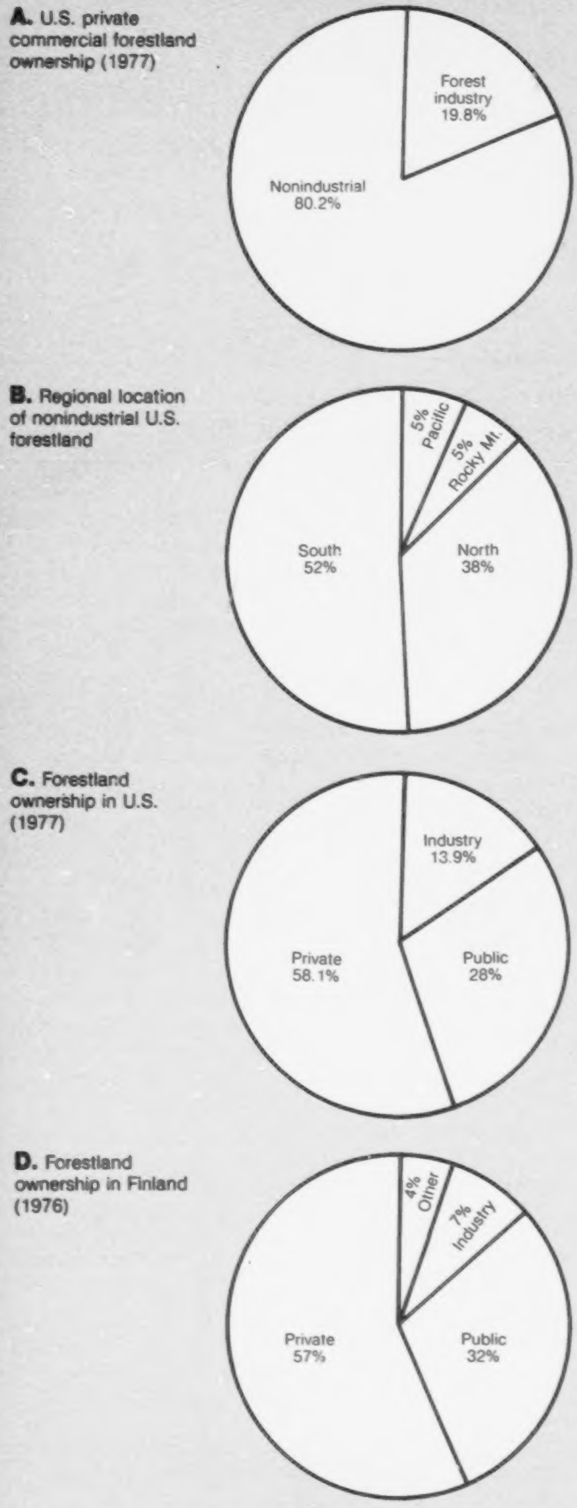
This gloomy forecast, combined with the increasingly large amounts of committed capital required to buy and hold large areas of forestland, has put new emphasis on the role of the private, nonindustrial forest landowner. For well over 25 years the U.S. Forest Service and the forest products industry have spent millions of dollars on programs to encourage private landowners, seen as the key to assuring future wood supplies, to increase productivity of their timberlands. But these programs have not been notably successful. One of the chief impediments appears to be the current forest tax structure. This article considers the question of whether alternative ideas and tax systems might help to motivate more efficient and intensive use of this nation's vast private forestlands.

The unmet potential

Only 20% of all privately owned timberland in the U.S. belongs to the forest industry (Figure 2A); the remainder, about 278 million acres, is held by nonindustrial landowners. A recent Forest Service assessment states that 45% of the latter, or about 124 million acres, could be considered to have economic potential for timber ventures. If this land were intensively managed on a continuing basis, it could add as much as 9.1 billion ft^3 annually to the nation's wood supply—almost one-third of the projected 2030 demand.

The South has special potential in this respect, since it contains 52% of the nation's total private nonindustrial commercial forestlands (Figure 2B). While the region's favorable growth rates, species mix, and geography make it particularly amenable to intensive forest management, Forest Service statistics indicate that privately owned southern forests averaged only 45% of their potential growth per acre in 1976. This clear lack of intensive

Figure 2. **Forest ownership breakdowns, U.S. and Finland**



Source: U.S. Forest Sevice and *Finnish Yearbook of Forest Statistics* (1976).

management reflects four basic problems:

- Low level of plantation establishment
- Failure to harvest timber at economic intervals
- Reluctance to reforest, even where it would be economically effective
- Failure to use thinnings/grown fiber in final harvest.

In view of the fact that southern timber growers are offered both state and federal forestry incentive programs, industry-backed landowner assistance programs, and Tree Farm Program of the American Forest Institute, this situation is paradoxical. It appears that these efforts are being thwarted by a forestland taxation policy that penalizes rather than encourages management.

U.S. forest tax policy

Because of the extremely long time between planting and harvesting, certain problems are inherent in all forest investments. One of the most serious of these is a (usually) low present value of a timber crop and an unimpressive financial return. For example, a stand of timber that takes 40 years to mature and is worth $10,000 when harvested has a present value of about $221 at a discount rate of 10% annually and only $37.33 for a 15% rate. Although simplified, this example illustrates the magnitude of the problem.

In an attempt to increase the return on investment for timber growing to levels that are at least competitive with alternative investments, state and federal governments have introduced laws to reduce the tax burden on the owners of forestland. One of the first such laws in the U.S. was passed in 1921 and allowed those who held timber for a specified period of time to qualify for capital gains tax rates rather than higher personal income tax rates upon "lump-sum liquidation" of their holdings.

To encourage long-term timber management, this policy was extended in 1944 to sale of timber under long-term cutting contracts. States then began passing special forest property tax treatment laws—many during the last 20 years—aimed at reducing or eliminating tax burdens during timber rotation and levying them at harvest time, when an income was realized. The goal of these tax policies is to try to make forest management financially acceptable by supplying financial aid at the front end of the operation, reducing mid-rotation costs, and increasing the return by reducing the initial investment.

Since 1914, specific government aid to motivate private nonindustrial forest management has intensified in the form of free or discounted forest management services and fire protection. Examples are the Smith-Lever Act of 1914, Clark-McNary Act of 1924, the Norris-Doxey Farm Forestry Cooperative Act of 1937, Cooperative Forest Management Act of 1950, and the recent Reforestation Tax Incentives of 1980.

Despite this government assistance, few privately owned nonindustrial forests in the U.S. are as intensively managed or have yields as close to their potential as forests in other countries. The explanation does not seem to lie solely in the abundance and relatively low price of U.S. timber; part of the reason is a fundamental difference in tax policy.

Penalties vs rewards

Essentially, the policy in the U.S. toward forest taxation is designed to make forest management financially acceptable. An opposing philosophy used in many parts of the world is to make forest nonmanagement financially unacceptable. These two difference approaches—making a socially beneficial action more attractive vs making failure to act more unattractive—are two means of reaching a similar end and represent the classic contrast of the carrot and the stick. A comparison of examples of how each policy is applied to forest taxation will help show their different effects on forest management.

Alabama's forest tax policy typifies the approach used in much of the U.S. As in most other states, its taxes are designed to reduce front-end and mid-rotation costs, thereby making the managed forest more attractive. A private landowner in Alabama who owns, for example, 50 to 60 acres of loblolly pine plantation on a 30- to 40-year sawtimber rotation is eligible for the following aid and is responsible for the following taxes:

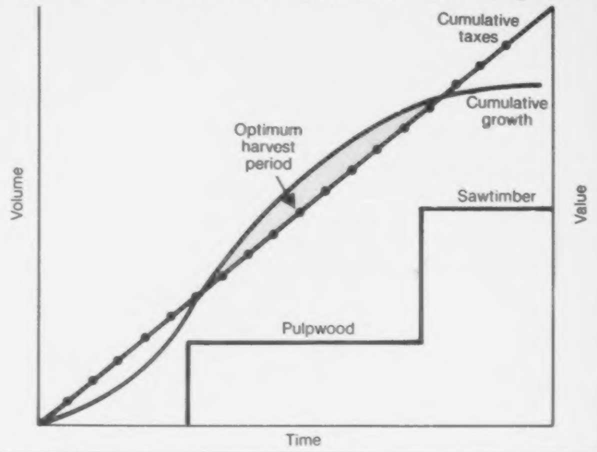
- Federal and state aid on a cost-sharing basis for plantation establishment and fire protection
- Automatic exemption on the value of the timber from local taxes, whether the forest is managed or not
- Assessment of the timberland at 10% of market value for ad valorem property taxes, which is at least 5% below the rate on other properties
- Imposition of a severance tax on "persons in the business of severing forest products" at harvest time
- State income tax and federal capital gains tax paid on harvest income.

The opposite tax philosophy—to make forest nonmanagement financially unacceptable—is exemplified by Finland, whose forests are generally acknowledged to be operating at the highest possible sustained yield. Despite a very different form of government, forestland ownership patterns in Finland in 1976 resembled those in the U.S. (Figures 2C and 2D). A private owner of 25 hectares (about 60 acres) of pine plantation in southern Finland on a 70- to 80-year rotation (due to slower growth rates) is eligible for the following aid and responsible for the following taxes:

- Government aid for the initial establishment of the plantation; in some cases, this includes exemption from any taxes until the timber crop is ready for the initial commercial thinning
- Annual income taxes imposed on the basis of presumed income per hectare. (For this purpose, the country is divided into 12 tax districts. Within each district, forestland is assigned to one of five "site capability classes" corresponding to its tree-growing potential. The number of hectares in each tax class on an owner's land is multiplied by the "forest tax figure," which is related to the average forest growth in that tax district, yielding a tax unit called a "tax cubic meter." The number of "tax cubic meters" presumed to be grown on an owner's land in a year is then multiplied by a "mean money value," a three-year average of prevailing local stumpage values. The result is the taxable "income" on which the owner must pay income tax. Deductions can be made from this "income" for owner management/administrative costs.)
- No harvest taxes, since taxes are paid throughout the rotation period.

These two approaches to forest taxation represent the extremes of a very wide spectrum; many other nations have intermediate philosophies. A comparison of the Alabama and Finnish systems is made to demonstrate the potential impact on the management of nonindustrial private forestlands. To make the comparison valid, certain assumptions have been made:

Figure 3. **Optimum harvest time with Finnish tax system**



- The land of both the Finnish and the U.S. landowner is zoned for agricultural use, so there is no pressure to sell it for development
- The land is already owned (tax effects on bid prices for forestland involve many issues beyond the scope of this article)
- The use that minimizes annual taxes is "forestry"; that is, the tax rate is lower than that on "agricultural cropland" and "improved land."

Comparison of U.S. and Finnish policies

Plantation establishment. The Finnish system gives owners a strong incentive to capture the most growth possible from forestlands because the government bases its taxes on average growth levels. This almost always leads to intensive plantation forestry because yields can often be doubled over those of natural, untended stands. Government loans are generally available for establishing plantations, and taxes can be waived until the timber is ready for its first commercial thinning.

Alabama also provides cost-sharing funds to promote plantation establishment and, as already mentioned, exempts timber from ad valorem taxes. But the law does not distinguish between a new pine plantation and a naturally reseeded scrub hardwood stand. Since the owner is eligible for the same special tax treatment whether or not he establishes a new plantation, there is no tax incentive to do so.

Thinning and harvest utilization. The Finnish forest tax system pressures an owner to maximize his yields. If a precommercial thinning will increase the growth rate of his trees and keep it above average, it is done. Commercial thinning helps to recoup planting and other front-end expenses. For the same reason, a forestland owner in Alabama is apt to commercially thin his stands.

Finland provides incentives to make the final harvest intensive and complete. The owner who has paid taxes for presumed growth for many years is motivated to realize as much of his investment as possible. Similarly, the forestland owner in Alabama is motivated to harvest intensively to maximize his profits. Thus, both tax systems provide similar incentives at this stage in plantation management.

Table 1. **Summary of tax effects on forest management practices**

Management method	U.S. (Alabama)	Finland
Plantation establishment	Financial aid available No tax incentive	Financial aid available Strong incentive, since taxes are paid on presumed growth
Thinning	Cost-sharing aid available Some incentive to recoup front-end costs	Tax deductions possible Strong incentive to increase growth rate and recoup front-end costs
Economic harvest	No tax-related incentive to harvest timber at an economic time. Incentives exist to leave timber standing indefinitely	Strong incentive to harvest while growth exceeds "average" growth on which taxes are based
Reforestation	Because owner is automatically eligible for special tax treatment, he has no incentive to absorb costs of reforestation	Strong incentive to get idle acres back into quality timber production

Harvest timing. In probably no other management aspect are the two tax systems more different than in their effect on the timing of timber harvests. Finland's system closely associates silvicultural and economic maturity (Figure 3). As long as the owner's current annual increment (the growth of his stand this year) is greater than the mean annual increment (the average growth on which his tax is based), he is earning tax-free income. As the stand matures, however, growth slows. When the two rates become equal, it is time to harvest and reforest with faster-growing young trees.

In Figure 3, the optimum time for harvest is shown as the shaded area. Harvesting is generally done during this period because at any later time the Finnish owner will be paying taxes on growth his stand is not producing.

One might expect the Finnish tax system to favor harvesting a high percentage of pulpwood and minimal volumes of sawtimber, because several more years' taxes must be paid before trees reach sawtimber size. However, timber increases in value by a stepwise rather than linear function (Figure 3), and the size of the step is large. Thus, owners of forestland often find the added expense to be justified. Moreover, the government can, if it chooses, reduce the slope of the tax line by selecting a longer rotation period. This extends the optimum harvesting period and reduces the incremental tax burden.

In the U.S., there is no similar harvest trigger point for the private landowner. He has no tax incentive to harvest timber at any particular time for either silvicultural or economic reasons. Harvesting may depend on the financial maturity of his stand, attainment of a particular timber size class, or maximization of current annual increment or net present value. For most owners, however, it probably hinges on when the going price seems good, a more attractive investment is found, an unexpected expense arises, or the owner retires. If none of these events occurs, the trees may remain untouched for years, particularly if the stand has been unmanaged. When they are finally harvested, the owner is liable for capital gains taxes, state income taxes, and possibly higher ad valorem taxes due to declassification of the forestland.

Reforestation. Although timber plantation establishment, thinning, and timing of harvests all affect future timber supply, cost, and availability, the most serious threat to this nation's future timber supply is the extremely low level of reforestation of private nonindustrial forestlands. In 1978, only 7.8% of Alabama's nonindustrial private forestlands were reforested after harvest. This low rate, which is typical of most states, means that an excessive area of land is being allowed to revert to lower-quality timber, with a resulting loss of growing time and reduction of timberland productivity.

The reason for such a low reforestation rate—at least in Alabama—is almost certainly that owners receive the same tax treatment for a naturally regenerated hardwood stand as for a capital-intensive pine plantation. (Recent legislation—HR4310—provides the first positive tax incentive for reforestation. However, it was passed too recently for its effects to be noticeable and may benefit primarily the larger nonindustrial private landowners.) Moreover, since a second rotation will often extend beyond the landowner's lifetime, he has little personal incentive to maximize the productivity of the stand.

By contrast, the law in Finland (and in several U.S. states) requires that timberlands be reforested after harvest or reclassified for some other use. Even in the absence of such a law, Finland provides strong incentives to get the land back into above-average production as soon as possible. Since taxes are based on average growth (perhaps of naturally regenerated stands), the landowner is encouraged to maximize forest growth beyond the level for which he will be taxed in any case.

Table 1 summarizes the impact of the two alternative tax systems on forest management. Alabama's system is clearly unrelated to intensive forest management and provides little incentive for investments by private landowners. A Finnish landowner can also own large tracts of unproductive timberland or let his trees go unharvested past maturity, but he will pay a price for keeping these resources idle and underutilized. Thus, Finland's forest tax incentives have been successfully aligned with the goal of maximizing the long-term yield from its forest resources.

Two "productivity taxes"—Western Oregon Small Tract Optional Tax and Florida's Green Belt Law—are currently on the books in the U.S. However, there is a significant difference between these and Finnish law. Annual growth is not directly considered in the U.S. laws; they simply modify the assessment of the value of the forestlands. More specifically, they base "annual income" on the entire rotation and capitalize it back to the present at current or estimated prices. Finland does not look at income-earning ability over an entire rotation; it taxes current annual growth at current prices, which are adjusted each year.

Applicability of the Finnish system

Would Finland's productivity tax system work in Alabama? And if it were introduced, what impact would it have on southern forestry? These are not easy questions to answer. Such a drastic change in the way forestland is taxed would create much initial uncertainty. Many owners, unwilling or unable to make the capital investment or pay the taxes, would probably sell their land. (Some experts believe that a major shift in ownership in the South is inevitable regardless, and that introduction of a Finnish-type system would simply accelerate this trend.)

The effects on the forest products industry would likewise be substantial. Large timberholding companies would be forced to cut surplus inventories and replace slow-growing, mature trees, but after a few years of adjustment they would probably benefit from the increased supply of wood on the market. This might moderate future price increases and allow the U.S. to remain a low-cost producer of fiber for the rest of the world.

For several reasons, however, it is likely a Finnish-type tax system, unaltered, would not work in the U.S.:

- The amount of government "oversight" needed to run the system might not be tolerated
- The idea of intensive, high-cost forest management is not widely accepted here due to the historic abundance of our natural resources; private nonindustrial landowners would have to undergo a major change in attitude
- A key reason the system works in Finland is the abundance of government aid, which makes investors' money more "patient" (investors in U.S. forest industries might turn elsewhere if such a tax system were introduced in the absence of government aid)
- Finland's forest industries are the backbone of its economy and foreign trade; its strong farmer "unions" negotiate the prices (not the case in the U.S.).

Nevertheless, although Finland's system would probably be unworkable here in its present form, those who formulate U.S. tax policy should not ignore its underlying principles and their effectiveness in promoting full utilization of relatively limited forest resources.

A U.S. alternative

A hybrid system that avoids some of the problems and incorporates the advantages of the Finnish system could prove very successsful in the U.S. If, for example, nonproductive or idle forestland were subject to a special tax, the proceeds could be applied to reforestation and cost-sharing programs. This would promote better forest management and also create an incentive for owners to utilize the programs. The recycled funds might also help to lower front-end costs, thereby making forest investments attractive as well as necessary.

The problem of future fiber shortages begs to be addressed in a broad forum. It seems that small federal subsidy programs and tax reductions have not been sufficient inducements for forest management in this country. The total tax burden on U.S. timber investment need not be increased; the essential task is to structure the tax system to encourage forest investment and to create strong incentives for efficient forest management. ☐

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PULP & PAPER
Chemical markets

Weak fertilizer markets ease sulfur supply

By BARRY SHOCKETT

The U.S. sulfur market, which had been characterized by a tight supply up until mid-1981, has loosened further due to continuing slow fertilizer, and thus, sulfuric acid demand.

Domestic Canadian demand has been decreasing since 1978, but exports to U.S. and offshore markets have risen steadily. New Middle East capacity may threaten Canadian producers markets, especially in Western Europe.

U.S. production, consumption, elemental sulfur (000 metric tons)

	1978	1979	1980	1981†	1982e
Capacity	13,000	13,000	14,540	15,300	16,000
Production**	10,011	10,827	10,785	10,914	11,300
Shipments*	10,125	12,015	11,837	10,434	10,500
Imports	2177	2494	2523	2522	2400
Exports	866	2044	1782	1392	1300
Apparent consumption	11,436	12,465	12,578	11,564	11,600
Sulfuric acid	8993	9547	10,257	9200	9500
Pulp and paper	96	124	94	100	100
Other††	2347	2794	2227	2264	2000

*Excluding sulfur content of byproduct H_2SO_4, H_2S, and SO_2
†Preliminary figures
**Recovered and Frasch sulfur only
††Including agchems, paints, petroleum refining, rubber and other plastics, inorganic chemicals, etc.

Source: U.S. Bureau of Mines

Canadian sulfur statistics (000 metric tons)

	1978	1979	1980	1981	1982e
Capacity	11,835	11,586	12,024	12,089	12,500
Production	5868	6313	7628	8192	8200
Shipments	5790.5	6077.8	7818.7	8310	7921
Imports	8	1.7	1.8	4.6	4
Exports					
U.S.	1185	1265	1517	1666	1500
Offshore	3803	3915.5	5315.5	5796	5600
Domestic demand	814	924.5	888	852.5	825
Sulfuric acid	486	594	575	540	530
Pulping	278	279	262	257	235
Other*	50	51.5	51	55.5	60

*Including carbon disulfide, hydrogen sulfide, rubber, asphalt, soil nutrients, and others.

SULFUR

UNITED STATES

Uses: Sulfite pulp mills consume most of the sulfur that is used by the pulp and paper industry; some is also utilized by kraft mills. The largest end-use (80%) of sulfur is the production of sulfuric acid.

Demand: The pulp and paper industry used 100,000 metric tons of sulfur in 1981, up 6.4% from the 94,000 tons consumed in 1980. Total consumption (excluding byproduct sulfur) in 1981 was 11.56 million tons, down 8% from the 12.58 million tons of 1980.

Sources: Sulfur is produced in two ways: Frasch and recovered (from refineries and natural gas production). Major producers are: Frasch-Duval, Freeport Sulfur, and Texasgulf, Recovered-Shell, Exxon, Standard (Calif.), Standard (Ind.), and others.

Availability: In general, sulfur is readily available due to current weak demand and growth in capacity. 1981, tight to market; 1980, tight; 1979, very tight; 1978, market to tight.

Pricing: The price at year-end for Frasch sulfur, f.o.b. Gulf Coast ports, had risen to $138.77/metric ton, however weak demand resulted in the price dropping to between $120 and $125/metric ton by the second quarter of 1982. Price history: 1981, $131.35-$138.73/metric ton, crude, bright, f.o.b. Gulf Coast ports; 1980, $103.31-$109.05/metric ton; 1979, $70.60/metric ton; 1978, $61.50/metric ton. Recovered sulfur is quoted at about $20/metric ton below Frasch prices.

Forecast: Additional sulfur capacity, to be brought onstream soon, will ensure an adequate U.S. supply. New capacity in the Middle East will increase global capacity, and could result in weak pricing.

CANADA

Uses: Sulfite pulp mills use sulfur to produce cooking liquor, Some is used to generate chlorine dioxide. The major use is for sulfuric acid production.

Demand: Pulp mills used 257,000 metric tons of sulfur in 1981, or 30% of total consumption, down slightly from 1980.

Sources: All sulfur produced in Canada is recovered.

Availability: By late 1982 or early 1983, capacity will grow almost one million metric tons, ensuring an adequate supply. 1981, tight to market; 1980, tight; 1979, tight.

Pricing: The average price of sulfur for North American shipments climbed 60.5% in 1981—to $63.22/metric ton, f.o.b. Alberta producing points from $39.36/ton in 1980. Currently, Alberta sulfur list prices are $80-$85/ton. The average export price for offshore markets last year, f.o.b. Vancouver, was $125/ton, while the f.o.b. Alberta price for export shipments was $93/ton. At the beginning of the second quarter, export sulfur was priced at between $96-$110/ton. Pricing history: 1981, crushed, slate, or molten, f.o.b. producing point, $59.58-$74.48/metric ton; 1980, $32.76-$59.58/metric ton; 1979, $24.82-$29.79/metric ton. (Note: prices are in Canadian dollars.)

Forecast: Increased mechanical pulp capacity will continue to decrease sulfur use by sulfite pulp mills. Total consumption may be one million tons by 1986 if economic factors improve.

Mr. Shockett is consulting editor-chemical markets for PULP & PAPER

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__COVER:__ A 60-ft-long apron conveyor delivers old corrugated clippings to new 330-tpd secondary fiber plant at MacMillan Bloedel's Pine Hill, Ala., mill. (Photo courtesy of Black Clawson.)

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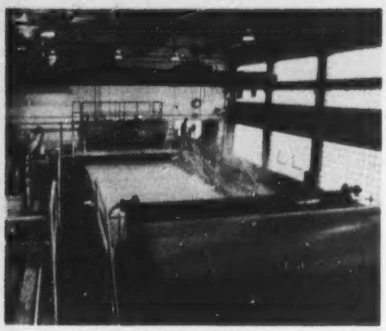
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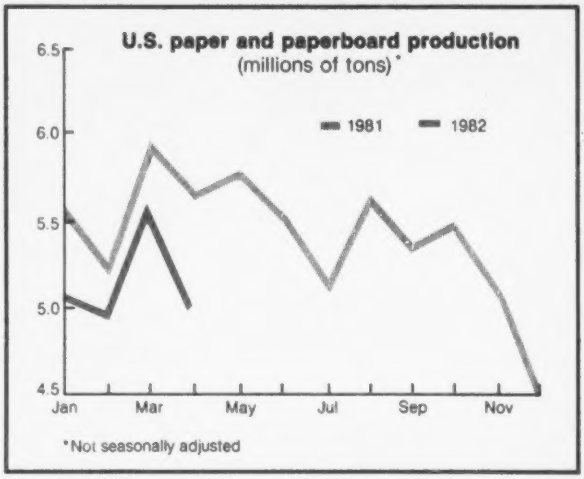
MONTH IN STATISTICS

U.S. paper and paperboard production in April totaled 5.0 million short tons, 8% below April 1981 levels, according to the American Paper Institute. Adjusted for seasonal and workday factors, the April rate of production came to about 59.6 million tpy, reversing the rising trend in production evident in February and March.

Among major grades, only newsprint and tissue production made gains over year-earlier levels. For the first four months of 1982, newsprint was 5.5% ahead of year-ago, while tissue edged up about 0.6%. Production of printing/writing grades averaged about 3% below year-earlier levels for the four-month period. All major grades of paperboard were below year-ago levels in production for the January-April period, with declines ranging from 6.5% for recycled paperboard to nearly 10% for semichemical medium. Unbleached kraft linerboard production fell 7%.

Total Canadian newsprint shipments in April came to 703,000 metric tons, down 10.1% from April 1982, according to the Canadian Pulp & Paper Assn. Newsprint mill operating rates slipped to 84% in April from 91% in March and 98% a year earlier. Year-to-date rates came to 92%.



		Latest month (000 short tons)	**% change from year ago**	**Annualized year-to-date** (000 short tons)	**% change from year ago**
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	April	437	1.4	5,320	5.5
Uncoated groundwood (s)	April	119	−6.3	1,381	−6.3
Coated paper (s)	April	398	−1.7	4,885	−1.8
Uncoated free sheet (s)	April	625	−11.0	7,859	−3.0
Unbleached kraft packaging and industrial (s)	April	288	−17.5	3,797	−7.6
Tissue	April	380	2.2	4,519	0.6
Total paper	**April**	**2,492**	**−6.4**	**30,902**	**−2.1**
Kraft linerboard, unbleached	April	1,145	−12.1	13,918	−7.5
Semichemical medium	April	370	−9.5	4,472	−9.9
Bleached paperboard	April	316	−5.4	3,745	−7.2
Recycled paperboard	April	562	−6.3	6,819	−6.5
Total paperboard	**April**	**2,475**	**−9.9**	**30,047**	**−7.4**
Total paper and paperboard*	**April**	**4,968**	**−8.2**	**60,948**	**−4.8**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	March	4,597	−1.0	51,444	−2.3
Market pulp production	March	536	−1.7	5,994	−4.3
Wastepaper consumption at paper/board mills	March	1,235	−2.1	13,818	−3.3
Pulpwood consumption (cords)	April	7,018	1.8	79,692	−0.8
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	April	19.941	−7.6	78.799†	−6.6
Containerboard inventories at box plants	Apr. 1	2,570	22.1		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	March	702	−6.5	7,841	−3.1
Imports of Canadian newsprint	March	603	−2.6	6,833†	−4.4
U.S. paper exports (including products)	March	408	−12.3	4,159	−13.9
Exports of unbleached kraft linerboard	April	153	−15.9	1,884	−5.3
Exports of woodpulp	March	319	−10.4	3,372	−9.0
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	April	703	−10.1	2,832†	−3.3
Operating rates	April	84%	98%	92%	97%
Inventories held by U.S. consumers	Apr. 30	1,632	24.5		
Woodpulp shipments (export only)	April	489	−21.8	1,959†	−17.6
Operating rates	April	75%	90%	83%	92%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn.
*Includes construction and wet machine grades. †Not annualized. ‡Not directly comparable to year ago because of coding change. (s) = shipments.

BUSINESS OUTLOOK

Delayed recovery seen for paper industry

This column is based on recent research reports by six leading analysts on the outlook for the paper industry.

The sluggish U.S. economy and delayed recovery in housing are causing most security analysts to again cut their earnings estimates for the paper and forest products industry in 1982.

While many analysts based previous forecasts on flat or slightly higher real GNP this year, most now look for a decline of between 1.0% to 1.5%. While earlier forecasts generally projected housing starts at between 1.2 to 1.3 million units this year, most analysts now project between 1.1 and 1.2 million units, with only 1.4 to 1.5 units in 1983.

Sluggish rebound. "Recent developments suggest a somewhat slower second-half upturn, with vigor of the rebound critically affected by how much interest rates are reduced from record-high levels, deficits are managed, and confidence is restored," said Thomas P. Clephane and Jeanne Carroll of Morgan Stanley. Added Gary Palmero of Oppenheimer: "Economic activity will be sluggish for the rest of 1982, as fiscal and monetary planners avoid reflation to rebuild confidence in the longer-term credit market."

With start of the economic recovery now moved back to the third quarter, most analysts look for between a 1.5% and 2.5% decline in paper and board production for all of 1982. With capacity continuing to expand, lower production is expected to result in operating rates in the 86% to 88% range and growing pressure on industry pricing.

"Capacity increases during the stop-and-go economy of 1979-82 have totaled 7.4%, while 1982 GNP should drop back to the 1979 level, and the FRP (Federal Reserve Production) Index in 1982 is projected to fall 5.8% below 1979," George B. Adler of Smith Barney, Harris Upham said. "As a result, 1982 operating rates in most of the important segments of the industry are declining to 85% to 88% of capacity, a historically poor level."

Most such forecasts are based on somewhat lower 1982 capacity growth than the 3.3% rise projected for paper and board in the last American Paper Institute survey. "Cyclical economic and financial pressures are forcing closure of aged, marginal units," noted Bruce Kirk of Goldman Sachs. "At the beginning of 1982, 600,000 tons were already closed; by year's end, we estimate another 1.2 to 1.3 million tons will be deducted from capacity data."

The slack market is intensifying pricing competition in the paper industry, where a 91% to 93% operating rate is usually needed to raise prices and improve profit margins. Palmero now only looks for a 3.6% average increase in prices this year, while costs advance 6.0%, "extending a classic profit margin squeeze."

"Weakness will be particularly noticeable in linerboard and related grades, where currently discounted prices approximate breakeven for a majority of industry producers," said Evadna S. Lynn of Merrill Lynch. "Although the paper segment of the industry generally has a brighter outlook, newsprint and coated publication papers are digesting large new-capacity additions and are less attractive."

1970-71 replay? Because price changes tend to affect paper industry profits more than production levels, some analysts wonder whether the current recession resembles the 1970-71 downturn, when production only declined 2.4% while profits dropped 43%. This contrasts with the more severe 1974-75 production downturn, following sharp price escalation after federal price controls were lifted, when profits declined "only" 19%, according to Adler.

While analysts late last year forecast either small profit gains or modest declines for 1982, most of the latest projections are for profit drops of between 20% to 30% for paper companies. While virtually every analyst was expecting a modest to sizable rise in earnings for forest products firms in 1982, most now look for between a 10% to 20% decline from 1981 levels, which were down sharply from 1980, which in turn were down from the 1979 peak.

What analysts are now projecting for the U.S. paper industry in 1982
(percentage change from 1981)

	Paper/ board production	Operating rates	Paper/ board prices	Operating profits
George B. Adler-Smith Barney	-2.5%	85%	n.a.	-25%/-30%
T. Clephane/J. Carroll-Morgan Stanley	-2.4	87	3.3	-25
Bruce Kirk-Goldman Sachs	-1.7	87	n.a.	n.a.
Evadna S. Lynn-Merrill Lynch	-4.5	83	1.3	-22
Gary Palermo-Oppenheimer	-1.6	90	3.6	-20
Mark Rogers-L.F. Rothschild, Unterberg Towbin	-2.8	86	2.4	-33

Recycled paperboard:

Weak demand, but lower fiber costs

Statistics:	**1980**	**1981**	**1982e**
Production, 000 tons[1]	7071	7001	6819
Capacity, 000 tons	8617	8593	8777
Utilization rate, %	82.1	82.3	77.7
Imports, 000 tons	22	30	33
Exports, 000 tons	249	174	134
Apparent U.S. consumption			
000 tons	6844	6926	6718
lb/capita	60.1	60.3	60.0
000 tons/$billion real GNP (1972)	4.62	4.59	4.52

1. American Paper Institute data

Grade structure: Recycled paperboard usually consists entirely of wastepaper, and is produced on both fourdrinier and multi-ply paper machines. Grades of recycled paperboard are generally classified into three categories: folding boxboard, setup boxboard, and paperboard. Most folding boxboard is clay-coated while most setup boxboard is uncoated. Recycled paperboard includes corrugating medium, linerboard, gypsum linerboard, and core, can, and tube stock; but it does not include any construction papers or boards.

Production/capacity: Production of recycled paperboard declined by just 1% from 7.1 million tons in 1980 to 7.0 million tons in 1981.

The packaging grades of recycled paperboard held up fairly well throughout 1981, according to American Paper Institute. Coated boxboard production increased 2.7%; tube, can, and drum stock, up 4.4%; and setup boxboard, up 2.1%. Demand for gypsum wallboard facings, however, declined, with production off by 21,000 tons—or 2%—and production for export off by 62,000 tons—or 74%. Total exports of recycled paperboard in 1981 declined 43.1% from 1980 exports of 249,000 tons, which was 40.7% higher than in 1979.

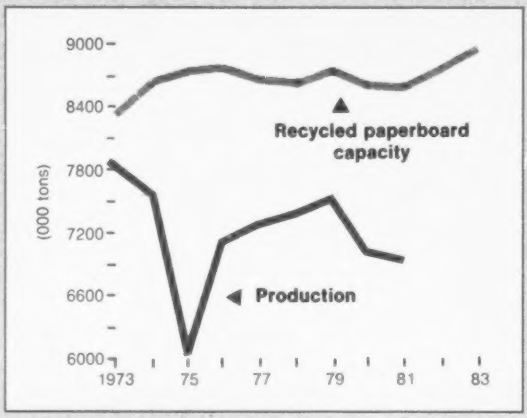
Recycled paperboard capacity, which has declined over the past decade, is expected to increase by 184,000 tpy in 1982. By 1985, total recycled paperboard capacity will grow by 352,000 tpy to 8.9 million tpy, unless 415,000 tpy of idle capacity is permanently shut down.

A recycled paperboard mill in Riegelsville, Pa., formerly owned by Whippany Paper Board Co., is scheduled to restart this summer with capacity expanded from 72,000 to about 135,000 tpy. Two other mills idled since Whippany declared bankruptcy in July 1980 were bought in June by a New Jersey real estate developer, but there are no definite reopening plans.

Outlook: Production is expected to decline from 7.0 million tons last year to 6.8 to 6.9 million tons this year and then to improve to 7.1 million tons in 1983.

Operating rates in recycled paperboard remained at about 82% in 1980 and 1981, and are expected to drop to 78% to 79% in 1982 and then start to increase in 1983 to 80% and reach 82% in 1984, analysts indicate.

Profitability of recycled board mills has been helped by a sharp drop in wastepaper costs, but these should begin to rise again when the economy recovers.



Estimated capacities of major U.S. companies are:

	Annual capacity (000 tons)	Capacity share (%)
1. Container Corp. of America	746	8.5
2. Sonoco Products Co.	555	6.3
3. National Gypsum Co.[1]	390	4.4
4. Whippany Paper Board Co.[2]	378	—
5. St. Regis Paper Co.	349	4.0
6. U.S. Gypsum Co.	347	3.9
7. Packaging Corp. of America	318	3.6
8. Caraustar Industries[3]	309	3.5
9. Newark Group	300	3.4
10. Federal Paper Board Co.	283	3.2
11. Alton Packaging	251	2.9
12. Rock-Tenn Co.	210	2.4

U.S. capacity (1981): **8.777 million tons**
Capacity share of top five companies: 27.2%[4]
Capacity share of top ten companies: 44.1%[4]

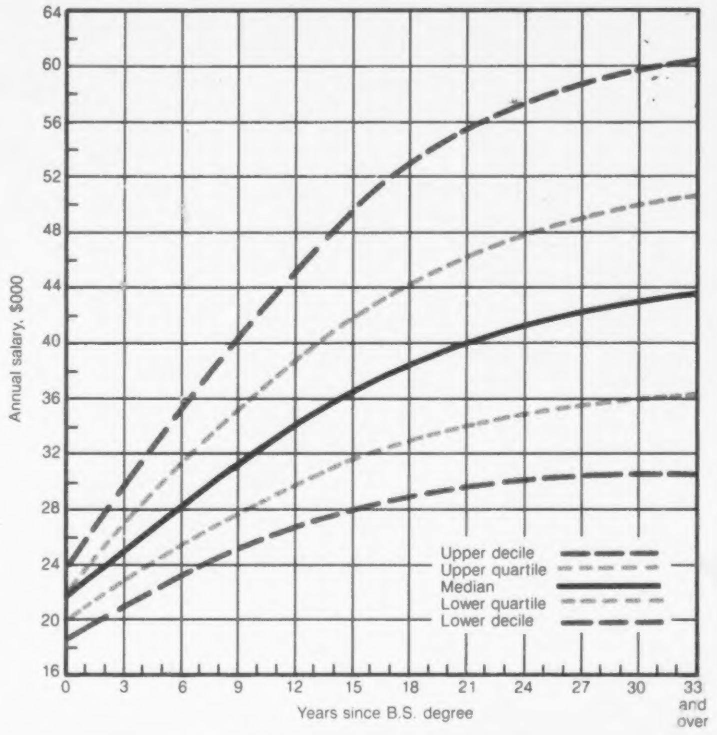
1. Includes Gold Bond Building Products, which the company bought in July 1981.
2. Does not include the Durham, Pa., mill, which was sold in 1981. Whippany's other mills, which have been idle since July 1980, were sold in June.
3. Holding company with ownership in Austell Box Board, Sweetwater Paper Board, Carolina Paper Board, and Carotell Paper Board.
4. Excluding Whippany.

Pricing: Clay-coated 20-pt folding boxboard (rolls) price history in $/short ton (year-end) is: 1975, $257; 1976, $262; 1977, $284; 1978, $305; 1979, $355; 1980, $400; 1981, $425; June 1982, $425.

Bending 20-pt chipboard (rolls) in $/short ton (year-end) is: 1975, $204; 1976, $212; 1977, $219; 1978, $225; 1979, $260; 1980, $275; 1981, $280; June 1982, $280.

Markets: Approximate market demand for the various recycled paperboard grades as measured by their capacity share is as follows: folding boxboard, 30%; setup boxboard, 4%; corrugating medium, 16%; gypsum linerboard, 15%; linerboard, 6%; container chipboard and filler board, 3%; and other paperboard, 26%.

Figure 1. **Annual salary of engineers in the paper and wood products industries since B.S. degree, 1981**



Paper industry salary hikes

By PAULA J. IRONS, News Editor

Table 1. **Engineers' median salaries by group**

Industry	**1981 salary**	**1980 salary**	**% change**
Petroleum	$39,200	$33,650	16.5%
R&D	36,050	28,850	25.0
Chemicals	35,400	33,750	4.9
Paper	**32,800**	**31,800**	**3.1**
Electrical and electronic	32,000	30,400	5.3
Construction and mining	31,850	30,100	5.5
Federal government	31,600	29,650	6.6
Aerospace	31,550	31,950	-1.3
Utilities services	31,550	28,550	10.5
Mechanical equipment	31,400	26,950	16.5
Design, consulting and engineering	29,300	29,050	0.9
Metals	28,900	26,800	7.8
Local government	28,150	25,250	11.5
State government	26,700	24,700	8.1
Average	**31,880**	**29,390**	**8.5**

Source: Engineering Manpower Commission

Complete salary data are published in *Professional Income of Engineers—1981*, which can be purchased for $35 from the Engineering Manpower Commission of American Assn. of Engineering Societies, 345 East 47th St., New York, N.Y. 10017.

☐ Engineers in the paper industry were paid a median salary of $32,800 in 1981, up only 3.1% over 1980 salaries and, like the salary hikes of most engineers in industry, below the 10.8% rise in the consumer price index from July 1980 to July 1981. Paper industry engineers were paid more than the average for 14 major industry groups, however, estimated at $31,880, according to the Engineering Manpower Commission of the American Assn. of Engineering Societies.

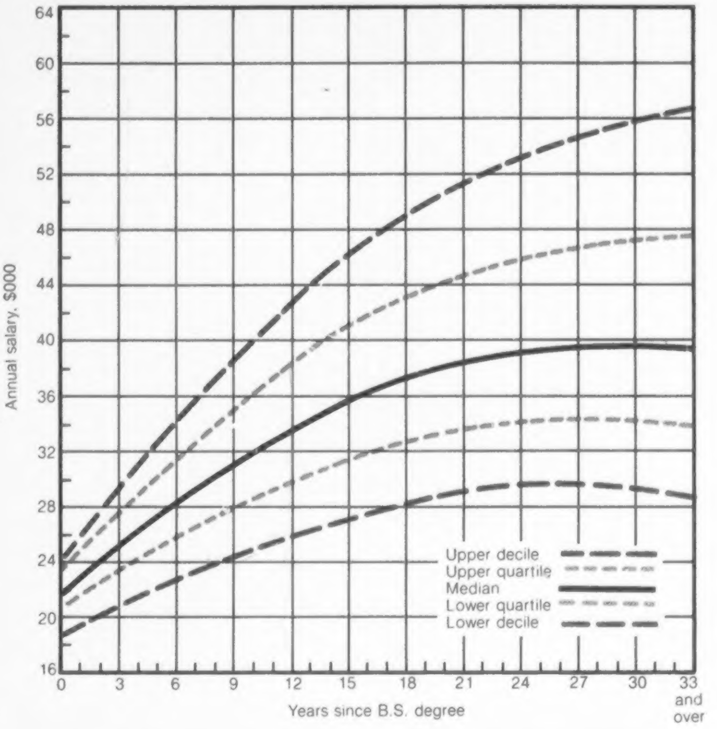
The commission's report, published on a yearly basis beginning in 1981 (previously published bi-yearly) surveyed companies, agencies, and other establishments representing over 153,500 engineers. The results of the survey are based on data gathered between February and May 1981.

Salary figures refer to base salary paid by employers before deductions and allowances, including cost-of-living differential, if any. Unpredictable payments for overtime work, stock options, and the like, are not included.

As shown in Table 1, paper industry engineers ranked fourth in median salaries paid in 1981, maintaining their 1980 ranking position. The 3.1% rise in salaries of paper industry engineers was one of the lowest increases among industries, however, and well below the average salary increase of 8.5%.

Compared with the 1980 survey conducted by the commission, the current survey shows salary increases for all engineers from 1980 to 1981 ranging from an ac-

Figure 2. **Annual salary of engineers in all industries since B.S. degree, 1981**



pinched by inflation in 1981

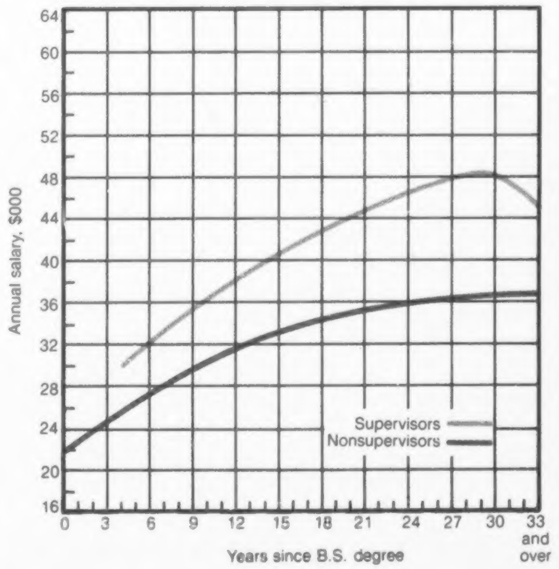
tual decline in salaries for aerospace engineers, who ranked second in the previous survey, to the 25.0% rise for engineers in research and development, who ranked ninth in the 1980 survey.

Salaries of all types of engineers in the paper industry are shown in Figure 1, which plots annual salary against the number of years after receiving a bachelor of science degree. For comparison, annual salaries of all industry enginers are plotted in Figure 2. Salaries of experienced engineers in the paper industry are up about 8% over 1980, according to the survey, while salaries for newly employed paper industry engineers are up about 3.3%, to a median starting salary of $21,700 and a high of $24,500.

On a regional basis, salaries of all engineers in the Pacific and mid-Atlantic regions were highest, followed by those in the north-central and west-south-central regions of the country.

Differences in salary exist for many reasons other than years of experience, and these factors must also be considered when comparing salaries. For example, data on all engineering categories show that engineers in supervisory positions earned considerably more than those who were in nonsupervisory positions. In the paper industry, salaries paid to all supervisory engineers average out to $41,250, while salaries paid to nonsupervisory engineers average out to $30,490, according to the survey (see Figure 3). □

Figure 3. **Median salaries of supervisory vs nonsupervisory engineers in the paper and wood products industries, 1981**



Pulp and paper industry ready to play role in U.S. drive to boost exports

But expansion in foreign markets may be stunted by growing protectionism, says API's Irene Meister, although U.S. government incentives may help

By DEBRA A. ADAMS, Assistant News Editor

☐ Export markets are becoming increasingly more important to industries such as pulp and paper because of more intense competitiveness in maturing domestic markets. American Paper Institute's international vice president, Dr. Irene W. Meister, who was appointed late last year to serve on the President's Export Council (PEC) and chairs one of its subcommittees which deals with incentives/ disincentives to trade, talked to PULP & PAPER about what the U.S. government proposes to do to open up export markets to the pulp and paper industry.

P&P: *What issues has your subcommittee worked on so far?*

Meister: The subcommittee I chair has an exceptionally broad scope for it deals with a variety of existing disincentives and searches for new incentives. We have identified seven major areas to work on and developed several resolutions, adopted by the full council. These already have been or will be shortly sent to the President. The most important one calls on the President to declare export expansion a national priority within the context of economic recovery and employment. We hope that specific programs will result from that. The U.S. share of exports worldwide fell from 18.2% in 1960 to 12.9% in 1981 and we need to restore our place in world trade.

The second resolution deals with the establishment of a special government/industry task force to determine a solution to the export financing problem—a major disincentive. Another resolution deals with domestic international sales corporations (DISCS)—an issue considerably important to the paper industry. There are several other resolutions that we are forwarding to the President.

The subcommittee on incentives/disincentives deals with various U.S. laws and regulations that hamper our exports, but also deals with numerous foreign nontariff trade barriers. We also examine such issues as reciprocity. The council's work, in broad terms, relates to our country's overall trade needs, and the paper industry is very interested in and supportive of my work.

P&P: *How crucial is export financing to the paper industry?*

Meister: Export financing is not as crucial to the paper industry as it is to other industries, except in one very important aspect. The paper industry is very dependent upon indirect exports. For example, when we have an increase in exports of other industries, we sell more boxes for shipping, and we use more white paper for export documentation. We have done some correlations between total trade and indirect exports of the paper industry and it is a very important segment of domestic sales for our industry.

A couple of years ago I estimated that indirect exports might be as high as $9 billion for the paper and allied products industry, and I think it would be higher now because overall U.S. exports have increased. So as an industry we have a very direct interest in total export trade, and when other industries cannot sell abroad due to lack of financing our domestic sales are adversely affected.

P&P: *What do you think should be done about the discrepancies in interest rates?*

Meister: My approach is to favor a long-term solution. But, in the meantime, we should not practice what I would describe as a unilateral disarmament on trade. Short term, we should provide Ex-Im Bank and other lending agencies with enough funds at competitive rates to keep the U.S. competitive.

P&P: *What do you feel are the chances for more funding for Ex-Im Bank?*

Meister: The PEC at its meeting on May 14 passed a resolution urging an immediate formation of a joint industry/government working group to determine the best means to achieve adequate export financing. We have to prove, and I think we can, that export financing will not

P&P: *What is the PEC's stand on DISCs? (Editor's Note: DISCs—or domestic international sales corporations—are formed by companies to enable them to defer indefinitely taxes on a certain portion of their export income.)*

Meister: DISCs originated in the U.S. in response to more advantageous tax provisions that other countries have been offering and continiue to offer for their exports.

As DISCs progressed through the years, their effectiveness has diminished because some of the original provisions had been taken away or greatly modified. But, it's still the best game in town.

The PEC strongly favors DISCs as long as other countries provide tax advantages. What's more, DISCs are especially important to smaller exporting companies, including smaller paper mills. The problem now is that DISCs are under attack in the General Agreement on Trade and Tariffs (GATT), and the U.S. government may be forced to come up with a GATT-compatible tax substitute for DISCs.

As of now, PEC strongly supports the present law authorizing DISCs and urges the U.S. government to defend it in GATT. Only if this defense fails, would we recommmend other alternatives which so far have not been promising.

P&P: *What is the status of negotiations concerning changing the definition of kraft paper and paperboard in the European Community?*

Meister: It's still a very hot issue for the industry. The European Commission has now endorsed the change in the definition. It is of major importance to the paper industry as well as to the U.S. government because it is believed that without the resolution of this problem, U.S. concessions granted during the multinational trade negotiations (MTN) would be "unbalanced."

The concessions that the U.S. government made during the 1978 MTN were linked to the understanding that the questions of definition for bleached and unbleached kraft paper and paperboard would be resolved. The new definition was adopted in 1978 by the Harmonized System Committee of the Customs Cooperations Council (CCC), but this new system will not go into effect for many years because it covers products of every industry.

What the U.S. government is asking, and the paper industry is urging, is that this CCC definition now be incorporated into the laws of the European Community (EC), which voted for this definition in 1978.

P&P: *What is the problem with the definition?*

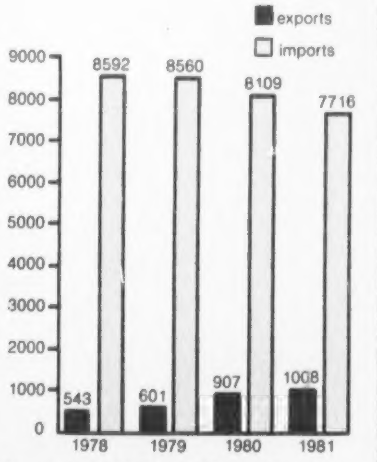
Meister: The current defintion requires that in order for a product to be designated as kraft and thus be eligible for the MTN tariff concessions, the product must contain 80% softwood. Bleached board and saturating kraft are definitely kraft products, yet the present EC definition excludes them from that category and thus a higher tariff is imposed on these products. The same is true for linerboard with less than 80% softwood content.

The new definition is much fairer, though more complex. It provides first, an umbrella definition for all kraft products including linerboard, bleached board, sack kraft, and saturating kraft. This overall definition requires that to be classified as kraft, the product must contain 80% sulfate fiber based on total fiber content. It can be either softwood or hardwood fiber.

Second, to offer greater protection—specifically, for the European producers—two additional provisions were included. For a kraft product to be classified as linerboard within the context of the unbrella definition, it must also meet a specific mullen requirement that varies depending on basis weight.

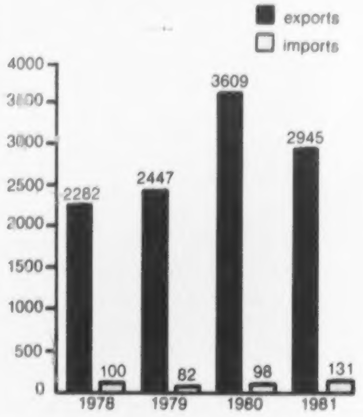
It is my belief, as well as that of the industry, that it will actually offer greater protection from the standpoint of performance requirements than offered by the present EC definition. In itself, all-softwood kraft linerboard is not a guarantee of performance. On the other hand, when you provide for mullen criteria, you already have established at least a minimum requirement of performance. It also gives Customs the tool to distinguish between kraft and testliner. Testliner has a higher duty.

Figure 1. **U.S. paper exports/imports, 1978-81**
(000 short tons)



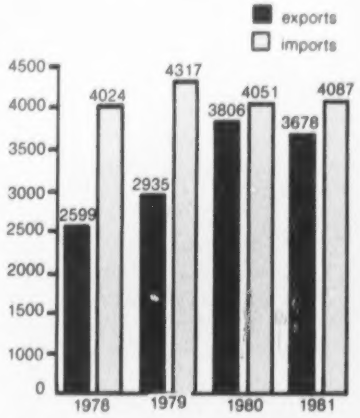
Source: American Paper Institute and U.S. Department of Commerce

Figure 2. **U.S. paperboard exports/imports, 1978-1981**
(000 short tons)



Source: American Paper Institute and U.S. Department of Commerce

Figure 3. **U.S. woodpulp exports/imports, 1978-1981**
(000 short tons)



Source: American Paper Institute and U.S. Department of Commerce

P&P: *Would you say the European Commission is looking seriously at this definition?*

Meister: Yes. I believe the Commission is concerned that it has not fulfilled its promise to the U.S. Unfortunately the definition has to be approved by the Council of Ministers, and so far the council has not approved it. This does not absolve the commission from its responsibilities, for as a final resort, the U.S. can retaliate on other products, but we hope it won't be necessary. At a European pulp and paper meeting in Helsinki on March 18, the EC director general said the question of definition is under intense examination.

P&P: *What is the purpose of the questionnaire on trade with Japan which was distributed by the API to its members during Paper Week?*

Meister: The U.S. government is looking into expanding trade with Japan. One industries they would like to see benefit from such expansion is pulp and paper. The U.S. government asked API to inquire whether or not the industry is handicapped in its penetration of the Japanese market, either because of tariff or nontariff barriers.

The preliminary analysis of the returns already indicates that our industry feels there are serious barriers to expanded trade with Japan. Tariffs are clearly identifiable as a barrier contributing to raising U.S. costs, but there are nontariff barriers as well.

P&P: *What is the current export-import situation between the U.S. and Japanese pulp and paper markets?*

Meister: The Japan paper industry is the second largest in production of paper and board; third largest in pulp. But their natural resources are limited and U.S. industry has a competitive advantage in many products. This is precisely the reason behind the U.S. government's questioning why a cost-competitive industry like U.S. pulp and paper is not having a greater share of the Japanese market.

Japan claims that its pulp and paper market is open. Paper and board imports in 1981 accounted for 2.9% of consumption of Japan's paper and paperboard. This is a very small percentage for an industry where costs of production are very high. Thus our government is challenging Japan's assertion that there are no serious tariff and nontariff barriers in Japan.

P&P: *Is there concern about the formation of import associations in places like Japan? (Editor's Note: The Japan Paper Importers' Assn. is one of the import associations formed so far in Japan.)*

Meister: In the U.S., the importers are interested in importing as much as they can because that's how they make their money. In Japan, the importer association's membership includes domestic producers. Thus, one wonders about the objectives of the association. Is it created to increase imports or to protect domestic manufacturers? We are asking this question.

P&P: *What is the status of the Export Trading Co. bill?*

Meister: It passed by a very large margin in the Senate and is pending in several committees in the House. The first action of the PEC was to urge the government to do everything possible to speed passage of the bill. We were sworn into the PEC in the morning on October 10 and sent a resolution to the President on this matter in the afternoon. Everyone agrees that there is a need to draw a greater number of U.S.companies into export activities, and this bill ought to help. Congressman Don Bonker, who spearheads the drive for this bill, feels that its chances have now greatly improved.

P&P: *Do you think these export trading companies will deal with particular industries, such as pulp and paper, or be set up to deal with many different industries?*

Meister: There are many ways export trading companies can be set up. There are two specific features of the bill. One authorizes banking participation in the activities of the trading companies, including equity participation. The other deals with certification by the Department of Commerce of antitrust immunity. Both provisions are especially important for smaller companies.

P&P: *What are your feelings on reciprocity legislation and the impact it could have on the pulp and paper industry?*

Meister: One of the problems I see is a lack of clear definition. Some feel it is a euphemism for protectionism. I do not think that it necessarily needs to be so.

Foreign countries have expressed very serious concerns about reciprocity legislation because there is no question that protectionism is on the rise especially among those representatives in Congress whose constituents have been hurt by imports particularly from Japan.

As a principle, reciprocity is nothing new. The whole GATT concept is based on reciprocity; all U.S. trade legislation is based on reciprocity. I would be very disturbed if reciprocity meant a sectoral approach to trade (that is, paper for paper, automobiles for automobiles, and so forth). I am convinced that the complexities of today's trading system will prevent solutions to trade problems on this so-called sectoral basis.

What we should talk about is equivalency of opportunities in the marketplace. Let's take Japan. We would like them to open up their markets for our competitive industries. I think this should be accomplished in the broadest sense of reciprocity. If Japan would be willing to persuade its citizens that there is nothing wrong with buying foreign goods and giving up some of their self-sufficiency, that might help prevent a drive for protectionist legislation in the U.S.

P&P: *Specifically, how do you feel Japan could open up its market to pulp and paper?*

Meister: There are many ways. I already mentioned one—persuading the Japanese people that near self-sufficiency should not be regarded as a goal. Japanese tariffs are still very high on paper products. Their current tariff on kraft linerboard is 12%. The reduction agreed on in 1979 will not even start until 1984 and then it will go down only two-tenths of a percent to 11.8%. The length of the transition until 1992 when the tariff finally declines to 7% does not make much sense. Japan made greater concessions on other paper grades where they are less concerned with competition, but still they are higher than could be expected from the country which is the world's second largest producer of paper and paperboard.

I have no doubt that unless Japan is willing to open its market to competitive U.S. industries in a truly meaningful way, the U.S. Congress is likely to legislate restrictions on imports to the U.S. market. Unfortunately, trade wars are no solution for no one wins. I still hope this will not be necessary, but time is running out. ☐

U.S. fiberboard industry is feeling effects of home-building recession

Trends are analyzed, outlook is given for three major types of wood-based fiberboard: insulating board, hardboard, and medium-density fiberboard

By LARS C. BRATT

☐ The deepening recession in the home-building industry is now having its effect on the fiberboard industry, to the extent that this industry depends on home-building as its major market. However, this extent differs considerably for various types of fiberboard.

This article examines three major types of wood-based fiberboard—insulating board, hardboard, and medium-density fiberboard—and discusses current production and consumption trends for each in the U.S. The outlook for these products is also explored in terms of new developments and capacity expansions (current and planned).

Insulating board

The term insulating board refers to a panel made from woodfiber or bagasse, having a density in the range of 20 to 30 lb/ft^3. The production of such board decreased from 3.8 billion ft^2 (½-in. basis) in 1971 to 2.5 billion ft^2 in 1980 (see Table 1).

Tonnage figures are given in Table 2. Official statistics for 1981 are not yet available, but reports from individual producers indicate that production is now below 2 billion ft^2 (½-in.), corresponding to an average capacity utilization of 40%. Per capita annual consumption has fallen from 19 ft^2 in 1971 to an estimated 9 ft^2 at present. Several insulating board mills have been permanently shutdown or have been converted to production of mineral-base acoustical tile.

This dismal situation is not solely due to the current condition of the home-building industry, since competition from "foamboard" is becoming increasingly severe. Foamboard has a core of poly-isocyanurate surfaced on both sides with aluminum foil. According to recent inquiries, 28 foamboard plants are now operating in the U.S., with an estimated annual capacity of close to 4 billion ft^2 (½-in.), or more than enough to replace the entire current production of insulating board in this country.

The main advantage of foamboard over insulating board is the higher R-value (thermal resistance) of the former. A typical R-value (expressed in °F × hour × Btu^{-1}) for ½-in. foamboard is 3.6 vs 1.5 for insulating board of the same thickness. Since building authorities in the U.S. recommend a minimum R-value of 11 for side

Mr. Bratt is a consultant with Forest Industry Associates, Palo Alto, Calif.

Table 1. **Insulating board production, imports, exports, and apparent consumption, 1970-1980**
(million ft^2, ½-in. basis)

				Apparent consumption	
Year	**Production**	**Imports**	**Exports**	**Total**	**Ft^2 per capita**
1970	3194	103	51	3246	16
1971	3839	115	65	3889	19
1972	3918	121	66	3973	19
1973	3914	140	79	3974	19
1974	3282	72	102	3252	15
1975	2960	36	77	2919	14
1976	3407	45	77	3375	16
1977	3462	106	84	3485	16
1978	3437	139	64	3512	16
1979	2973	129	50	3052	15
1980	2469	100	68	2501	11

Sources: USDA Forest Service, Bureau of the Census walls, which is usually obtained by using fiberglass insulation in addition to sheathing and sheetrock, the use of foamboard in place of insulation board would permit the use of a thinner layer of fiberglass insulation.

However, according to Owens-Corning Fiberglass Corp., their standard 3½-in. fiberglass insulation, which would fit in a studwall, has an R-value of 11, making the use of asphalt-reinforced insulating board acceptable as wall sheathing. Nevertheless, as long as the price ratio for foamboard to insulation board (3:2 at present for ½-in. board) does not increase, the production of insulating The term "hardboard" refers to a hot-pressed panel made from wood fiber or bagasse, having a density in the range of 50 to 65 lb/ft^3. There are actually four types of hardboard, all of which are made in the U.S.: wet-formed and wet-pressed board (smooth one side—S1S), wet-formed and dry-pressed (smooth two side—S2S), dry-formed and dry-pressed board (S2S), and dry-formed and wet-pressed board (S1S). Of the 22 hardboard plant now operating in the U.S., 10 use dry-forming techniques.

Production of hardboard in the U.S. has increased slowly during the last decade, from 5.1 billion ft^2 (⅛-in.) in 1971 to 5.9 billion ft^2 in 1980 (see Tables 2 and 3). Per capita consumption rose from 27 ft^2 (⅛-in.) in 1971 to 29 ft^2 in 1980.

Imports of hardboard have tapered off from about 1 billion ft^2 (⅛-in.) in 1973 to about 0.5 billion ft^2 in 1980, corresponding to 10% of the domestic production. A significant fraction of these imports come from Brazil. Exports remain negligible; that is, less than 0.1 billion ft^2 (⅛-in.) in 1980 (See Table 3).

While the hardboard industry in the U.S. is doing considerably better than the insulating board industry in terms of capacity utilization and profit, the market for standard commodity-grade hardboard is depressed, since it depends greatly on the home-building industry.

The director of the American Hardboard Assn., James Nolan, estimates that the current average capacity utilization for the hardboard industry in the U.S. is about 60%. However, the operating rates for individual mills vary greatly, from 0% to 100%, depending mainly on competitive aspects such as product quality, manufacturing cost, and marketing organization.

For example, for Superwood Corp.'s dry-process hardboard plant in Phillips, Wis., 1981 was the best year ever. In 1981 this plant was making mainly printed wall panelling. Weyerhaeuser's hardboard plant at Klamath Falls, Ore., is operating seven days a week, three shifts/day, turning out 7/16-in. hardboard siding, having a density of only 46 lb/ft^3, which is actually in the range of medium-density fiberboard.

In general, mills turning out hardboard siding seem to be doing much better than average. Celotex Corp.'s mill at Paris, Tenn., is also operating at 100% capacity, producing siding only. In fact, hardboard siding is becoming the most important product of the hardboard industry.

According to figures published by the American Hardboard Assn., the volume of hardboard siding produced in the U.S. is now 50% to 60% of the total volume of hardboard produced in this country. However, some of this hardboard has such a low density that it should actually be classified as exterior-grade, medium-density fiberboard. For example, the "insulite" hardboard siding produced at Boise Cascade's International Falls, Minn., mill, has a density of only 40 lb/ft^3 and a thickness of 7/16-in. This board is made with the wet process, impregnated with a high percentage of Gilsonite, a binder obtained from coal, and then dried in an insulating board dryer before being hot-pressed to the desired density. A similar siding is being produced by Abitibi-Price Corp. at Roaring River, N.C. The Catawba, S.C., Champion Building Products plant has also specialized in making only hardboard siding. This product is made with the dry process, using phenol-formaldehyde resin as the main binder, and has a density of 50 lb/ft^3.

In general, the dry-process hardboard plant seem to be doing somewhat better than the wet-process plant in the current depressed market, in spite of the higher resin cost of dry process board. Georgia-Pacific's plant at Conway, S.C., making dry-process S2S board, managed to boost production to 110% of capacity throughout 1981. Champion Building Product's plant at Lebanon, Ore., and Superwood's plant at Bemedji, Minn., both operated near capacity in 1981, using the dry process.

No new hardboard plant has been built in the U.S. during the last decade. Worldwide, no new dry-process hardboard plants have been built since 1978. Sunds Defibrator engineered a new wet-process hardboard plant in Thailand, which started up in 1981. Sunds also contributed to the design/construction of a new wet-process hardboard plant for Duratex in Brazil. This plant has a

Table 2. **Trends in production and consumption of hardboard and insulating board in U.S.A., 1970-1980**
(thousands of short tons)

	Production		Imports		Exports		Apparent consumption	
Year	Hardboard	Insulating board	Hardboard	Insulating board	Hardboard	Insulating board	Hardboard	Insulating board
1970	1463	1219	152	39	26	19	1590	1239
1971	1718	1446	211	43	28	25	1901	1465
1972	1908	1529	357	47	34	26	2230	1550
1973	2001	1547	346	55	43	31	2304	1571
1974	1978	1295	250	28	59	40	2169	1283
1975	1784	1249	92	15	55	32	1821	1232
1976	2110	1434	169	19	66	32	2214	1421
1977	2237	1403	211	43	59	34	2388	1412
1978	2416	1425	296	58	26	27	2687	1456
1979	2306	1136	261	53	32	21	2535	1168
1980	1970	949	172	38	29	26	2113	961

Sources: USDA Forest Service, USDC Bureau of the Census

200-tpy capacity, and was scheduled to go on-stream in May. The Duratex plant is using a single-stage, pressurized refiner with digester, which is able to process the entire input of eucalyptus chips. Such a refiner requires 2250 kw, or more than 3000 hp, to operate at capacity.

New hardboard developments

Major developments in hardboard technology seem few and far between, perhaps because this industry has already succeeded in manufacturing a product of satisfactory and constant quality at low cost with few operating problems. However, Superior Fiber Products, Superior, Wis., appears to have recently made a major contribution to wet-process hardboard technology. This company has developed a successful closed system for the water used in manufacturing, without experiencing a decline in board quality.

It has also been reported that the hardboard siding mill of Abitibi-Price Corp., Roaring River, N.C., is equipped with a closed system for its effluents, but the local management has declined to provide any technical information. Since disposal of effluents from a wet-process hardboard plant is usually a serious and costly problem, the development of a satisfactory closed system for handling such effluents must be considered a major contribution to hardboard technology.

The technology used for making dry-process hardboard at Louisiana-Pacific's Oroville, Calif., plant, deserves to be mentioned in this context, since it makes use of a continuous press; that is, a circular press similar to the press used in the Mende process for making thin particleboard. The staff at Oroville adapted this press to hardboard manufacture and has been operating successfully since 1974.

With this method, chips are processed through a standard Defibrator digester attached to a 36-in. Asplund refiner. The fibers are dried in two flash-tube dryers, using hot air heated by passing over steam radiators. Urea-formaldehyde resin is added in the blender ahead of the dry former. The resin-impregnated fiber mat is then cured by passing around a heated steel drum, 10 ft in dia. The mat is pressed against the heated drum by an endless steel belt which, in turn, is pressed against the big drum by means of two smaller oil-heated steel drums, 4 ft in dia.

The S2S board produced in this manner has a density of 46 to 50 lb/ft^3 depending on thickness, which ranges from 0.1 to 0.25 in. Forming speed varies from 50 fpm, when making 0.1-in. board, to 25 fpm when making 0.25-in. board. This board has been well-received in the hardboard market, since it is stronger than thin particleboard and has two very smooth surfaces, suitable for printing or plastic overlays.

An important, promising new hardboard product has been developed by Masonite Corp. in the form of an embossed roof shingle made by hotpressing a moist fiber mat between engraved press platens. The shingle is sold under the tradename of "Woodruf." It looks much like a cedar shingle or shake and is priced about the same. The Woodruf shingle can be made fire-resistant by a special process to obtain a Class C fire rating, the same as for asphalt shingles. But, the price of the treated shingle is much higher than that of the untreated shingle.

Medium-density fiberboard

The term "medium-density fiberboard" (MDF) refers to a wood-based, dry-process fiberboard having a density in the range of 40 to 48 lb/ft^3. Nowadays, medium-density fiberboard seems like a rather obvious development; that is, if a good quality hardboard can be made with the dry process, the same or at least a similar process could logically be used to make a lighter and thicker board, to compete with particleboard.

However, in 1966, when the first MDF plant came on stream in Deposit, N.Y., it did not appear to be such a promising development. The manager of particleboard production for one of the largest forest product companies in the U.S. declared it to be a "stillborn" idea, which would never be of any commercial importance. Twelve years later, in 1978, MDF production in the U.S. exceeded 0.5 billion ft^2 (¾-in.), corresponding to 14% of the particleboard production in this country (see Table 4). During the three-year period from 1975 to 1978, MDF production grew at an average annual compound rate of 36%, compared with 15% for particleboard during this period.

Anything particleboard can do MDF can do, but not vice versa. MDF can be machine-edged with ease, embossed, engraved, and contoured, and is more profitable to make. It sells at a premium of \$100 to \$125/1000 ft^2 (¾-in.) over the price of particleboard made for the same usage. This premium is despite the fact that MDF can be made from a cheaper raw material (like mixed hardwoods, which are normally unsuitable for particleboard).

In terms of operating rate, or capacity utilization, the producers of MDF board are doing much better than most producers of hardboard, not to mention insulating board. The average annual operating rate in 1980 for the 11 MDF plans in this country was 80%. Since the main market for MDF board is furniture manufacture, MDF producers have not been as adversely affected by the depressed home-building industry as have producers of other fiber-

Table 3. **Hardboard production, imports, exports, and apparent consumption, 1970-1980**
(million ft^2, ⅛-in. basis)

Year	Production	Imports	Exports	Apparent consumption Total	Apparent consumption Ft^2 per capita
1970	4340	452	77	4715	23
1971	5126	631	83	5674	27
1972	5671	1060	103	6629	32
1973	6049	1047	131	6965	33
1974	5845	739	175	6409	30
1975	5093	264	158	5198	24
1976	6016	482	187	6310	29
1977	6567	618	174	7011	32
1978	7376	903	78	8200	37
1979	7304	803	99	8008	36
1980	5899	545	92	6352	29

Sources: USDA Forest Service, Bureau of the Census board grades. But in the long term, the decline in new home production in the U.S. will undoubtedly cause a substantial decline in the demand for furniture. However, since much of the current demand for MDF is caused by replacement of particleboard with MDF, producers of MDF are likely to continue to prosper even under current economic conditions, at the expense of particleboard producers.

There have been no new MDF plants built in the U.S. since 1975. However, two new plants are in the planning stage. Duraflake is planning to convert an old particleboard plant located in Malvern, Ark., into a modern MDF plant, as soon as suitable financing can be arranged. Frontier Fiber is planning to build an MDF plant at Las Vegas, N.M., financed by Public Service of New Mexico.

The superior properties of MDF have also stimulated interest in MDF production abroad. Medford Corp. is building a new MDF plant in Ireland, and Sunds Defibrator has engineered new MDF plants in Italy, Austria, Spain, Tunisia, and South Africa. Siempelkamp has built a new MDF plant in Turkey. One informed source claims that MDF productin in Western Europe now amounts to about 275 million ft² (¾-in.), corresponding to only 2% of the particleboard production there, compared with 16% in the U.S.

MDF technology

Technology of MDF manufacture apparently has not changed much in recent years, although high-frequency (radio frequency) heating of the board seems to be on its way out, perhaps mainly due to the current high cost of electric energy. Of the 11 plants now producing MDF in the U.S., 5 are not equipped with RF heating, but have increased the press size so as to compensate for the longer curing time required. An MDF plant recently built in Italy is equipped with a new type of continuous board press, made by Kusters of Krefeld, W. Germany.

An interindustry controversy seems to be going on concerning the best method for adding urea-formaldehyde resin to MDF. One producer, who is adding the resin to the dry fiber going on conveyors from the dryers to the blender, claims that blowline addition of the resin, while the fiber is blown from the refiner to the dryer, can result in the presence of free formaldehyde in the finished board. This claim is backed up by the staff of Borden Chemical Co. at Eugene, Ore. However, the interviewed producers of MDF board who do use blowline addition of the UF resin claim to have had no customer complaints over formaldehyde fumes. □

Table 4. **Comparison of MDF and particleboard production in the U.S.A. 1975-1980**
(million ft², ¾-in. basis)

Year	Medium-density fiberboard	Particleboard	MDF as percent of particleboard
1975	216	2539	8.5
1976	280	3202	8.7
1977	441	3593	12.3
1978	539	3866	13.9
1979	534	3536	15.1
1980	513	3029	16.9

Source: National Particleboard Association

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Sodium sulfate markets remain flat in '82

By BARRY SHOCKETT

The general economic malaise has resulted in little growth in U.S. sodium sulfate (saltcake) consumption over the last two years. In fact, consumption has been down since 1978, when it reached the 1,300,000-ton level.

Domestic markets for sodium sulfate in Canada have not been that strong either over the last four years, with the only bright spot a substantial growth in exports, most to the U.S. Exports increased about 27% in 1980, almost 15% in 1981, and should increase 16.5% in 1982.

U.S. sodium sulfate statistics (000 short tons)

	1979	1980	1981	1982e
Capacity				
Natural	650	650	650	500
Synthetic, byproduct	600	600	600	600
Production				
Natural	533	583	608	480
Synthetic	588	536	536	535
Imports	188	230	275	360
Exports	102	129	124	115
Apparent consumption	1235	1236	1262	1260
Pulp and paper	667	593	612	611
Detergents	395	482	492	491.5
Other, glass and misc.	173	161	158	157.5

Source: Bureau of Mines, U.S. Dept. of the Interior

Canadian sodium sulfate statistics (000 short tons)

	1979	1980	1981	1982e
Capacity*	921.5	951	940	944.5
Production	591	653.5	695	749.5
Imports	22	22.3	13.7	11
Exports	212.7	271	313.5	366
Apparent consumption	400.3	404.8**	395.2	394.5
Pulping	328	327.5	319.7	315
Detergents	48.5	50.2	50.7	51.3
Other	23.7	23.7	24.8	28

* includes 85-tpy byproduct capacity
**including inventory buildup

SODIUM SULFATE

UNITED STATES

Uses: Saltcake is the main source of makeup sodium and sulfur for kraft pulp mills. Sodium sulfate is also used by the detergent industry, for glassmaking and others.

Demand: In 1981, pulp mills used about 48.5% of total Na_2SO_4 consumption. 1982 pulp mill demand is estimated to be 611,000 tons, close to 1981 levels. Since 1979, Na_2SO_4 used in detergents has increased from 32% to 39% of total consumption, and this market accounted for 492,000 tons in 1981. In 1981, 275,000 tons were imported (22%) and is estimated to increase to 28% in 1982.

Sources: There are two sources for saltcake: natural and synthetic (or byproduct). Natural Na_2SO_4 capacity has decreased to 45.5% of total capacity recently. Major producers are: natural—Kerr-McGee, Great Salt Lake, and Ozark-Mahoning; synthetic—Allied, Akzona, Morton, Diamond Shamrock, Autex, Climax Chemical, Courtlaulds, and others.

Availability: Continuing weak demand coupled with increased imports should maintain an adequate supply. 1981, market; 1980, tight to market; 1979, market to tight.

Pricing: There have been no announcements of U.S. price increases since last July, when the list price rose to $79/ton on the West Coast and $81/ton in the South. However, since then Canadian shipments across the border went up $5/ton, on April 1, 1982, to C$76/ton, f.o.b. producing points. Price history: 1981, $68-$79/ton; 1980, $60-$68/ton; 1979, $47-$52/ton.

Forecast: In the longer term, pulp mill usage is expected to decrease gradually, depending on the extent to which chlorine is replaced by chlorine dioxide for bleaching. Total demand could increase as much as 2% to 3% over the next couple of years. However, a recent Bureau of Mines study predicts an average decrease of 1.5% per annum to the end of the decade.

CANADA

Uses: Kraft pulp mills are the largest consumer of sodium sulfate, followed by the detergent industry and various small end uses.

Demand: Canadian pulp mills used about 320,000 tons in 1981, or 80% of total demand. This is down from 1980 levels due to strikes. Weakness in market pulp markets will reduce mill consumption again in 1982, to 315,000 tons. The next largest end use, by synthetic detergent producers, used an estimated 50,700 tons in 1981.

Sources: There are five producers in Canada: Saskatchewan Minerals, Francana Minerals, Alberta Sulphate, Midwest Chemicals, and Ormiston Mining and Smelting produce natural saltcake. Courtlands and Ontario Paper produce byproduct sulfate.

Availability: Nameplate capacity is sufficient to handle demand on both sides of the border for the foreseeable future. 1981, market; 1980, market; 1979, market.

Pricing: The price of saltcake was increased to $75/ton, f.o.b. producing points, on April 1, 1982, a rise of $5/ton. In 1981, there were two price hikes totalling $15/ton. Price history: 1981, $55-$70/ton; 1980, $50-$55/ton; 1979, $50/ton.

Forecast: Production is expected to increase again in 1982, mainly as a result of more exports to the U.S. Pulp mill usage will continue to decrease. However, the new end use area (solar heat sinks) is expected to grow substantially.

PULP & PAPER

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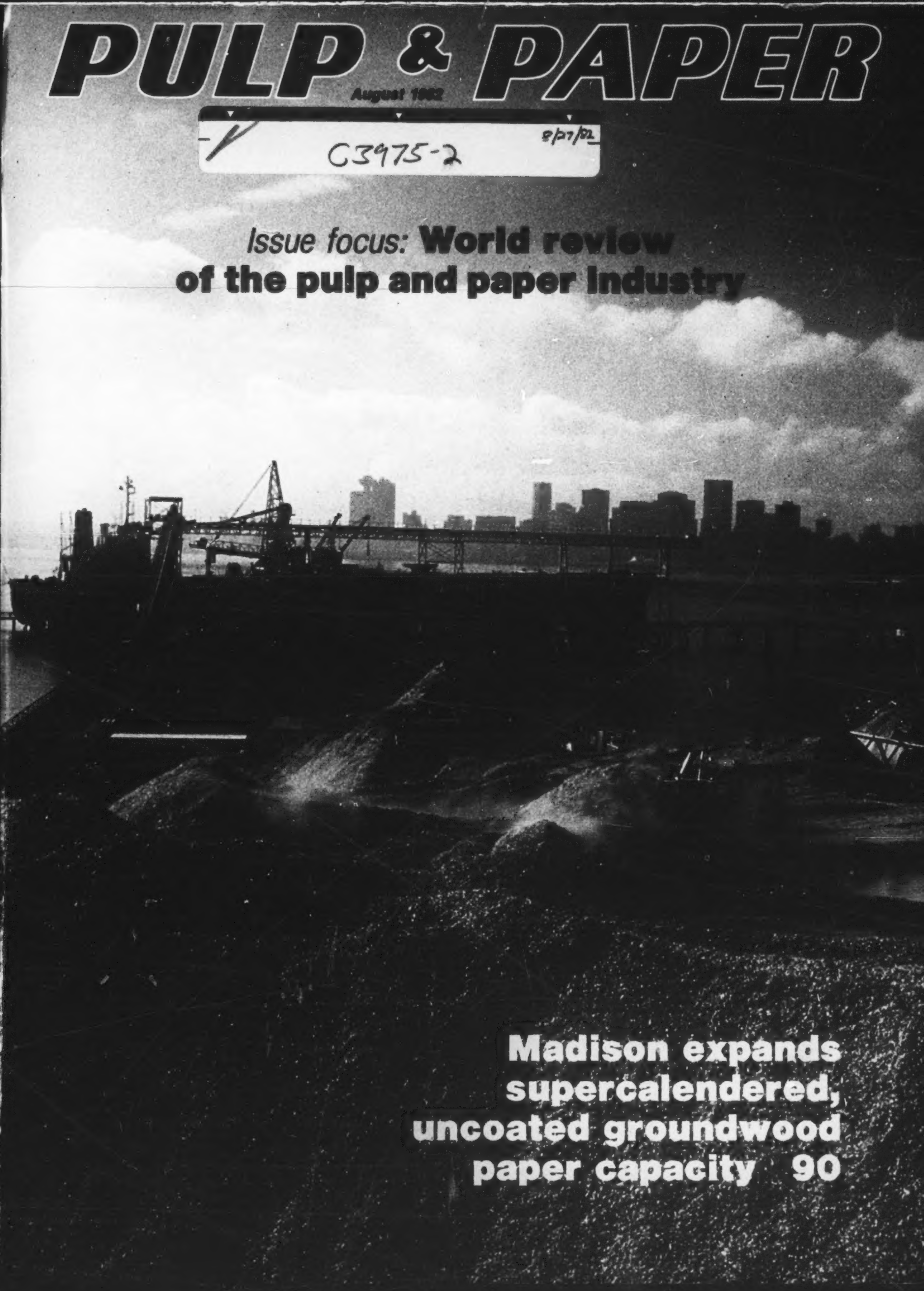

Issue focus: **World review of the pulp and paper industry**

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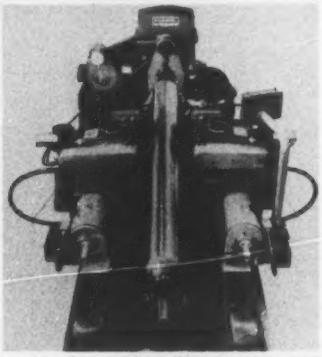

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COVER: Canada's largest chip exporting facility in North Vancouver, B.C., (see article on p. 71) is one of several special features in this issue on world developments in the pulp and paper industry. (Photo courtesy of Rader Companies.)

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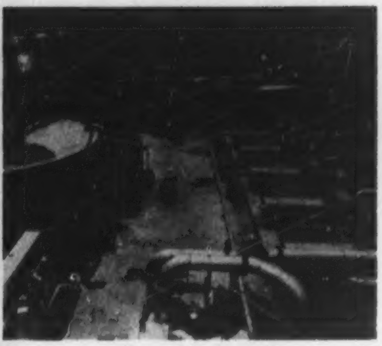
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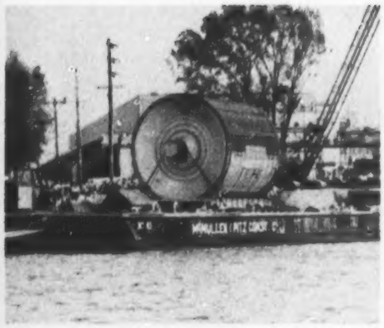
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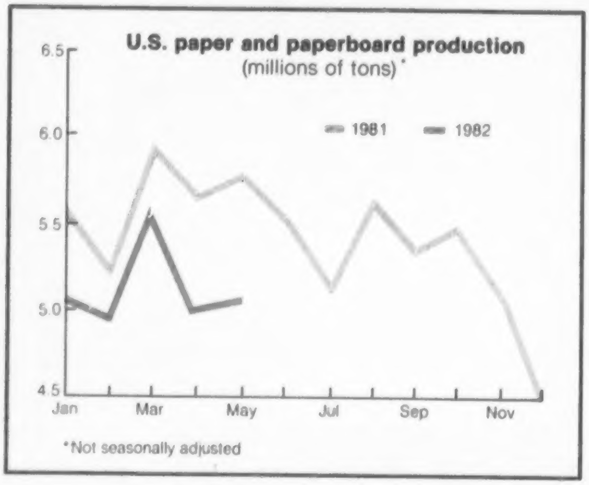
MONTH IN STATISTICS

U.S. paper and paperboard production in May totaled 5.1 million short tons, 7.9% below May 1981 levels, according to the American Paper Institute. Adjusted for seasonal and workday factors, the May production rate came to 59.9 million tpy, down from the first-quarter 1982 average of 60.9 million tpy.

Among major grades, only tissue production was up in May over year-earlier levels. For January through June on an annualized basis, newsprint continued to show the strongest pattern, up 3.5% over the same period a year ago, while tissue production held close to year-earlier levels and packaging and industrial grades were down 10.3%. All sectors of paperboard, paced by kraft linerboard, showed declines, with the largest drop in semichemical medium. Weekly data for the first two weeks of June indicate that paperboard production moved below its May rate, while paper production appeared to have remained flat.

Total Canadian newsprint shipments in May came to 718,000 metric tons, down 3.6% from May 1982, according to the Canadian Pulp & Paper Assn. Newsprint mill operating rates climbed to 88% in May from 84% in April, but were still well below the 97% of a year earlier.



		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	May	424	−4.3	5,274	3.5
Uncoated groundwood (s)	May	119	−2.5	1,400	−5.4
Coated paper (s)	May	410	–	4,917	−0.6
Uncoated free sheet (s)	May	630	−10.4	7,876	−3.6
Unbleached kraft packaging and industrial (s)	May	270	−21.1	3,686	−10.3
Tissue	May	390	1.0	4,497	−0.6
Total paper	**May**	**2,475**	**−6.7**	**30,660**	**−2.7**
Kraft linerboard, unbleached	May	1,195	−9.3	14,0[illegible]	−7.9
Semichemical medium	May	390	−8.0	4,510	−9.6
Bleached paperboard	May	329	−6.1	3,819	−6.5
Recycled paperboard	May	571	−9.9	6,847	−6.9
Total paperboard	**May**	**2,587**	**−8.9**	**30,299**	**−7.6**
Total paper and paperboard*	**May**	**5,062**	**−7.9**	**60,960**	**−5.2**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	April	4,208	−7.0	51,207	−3.5
Market pulp production	April	494	0.4	5,976	−3.2
Wastepaper consumption at paper/board mills	April	1,157	−5.8	13,834	−3.4
Pulpwood consumption (cords)	May	6,791	−1.3	80,142	−0.9
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	May	18.720	−6.1	97.519†	−6.5
Containerboard inventories at box plants	May 1	2,656	19.0		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	April	600	−14.2	7,836	−7.8
Imports of Canadian newsprint	April	500	−13.0	6,625†	−6.5
U.S. paper exports (including products)	April	343	−22.7	4,149	−16.3
Exports of unbleached kraft linerboard	May	181	−1.6	1,941	−5.3
Exports of woodpulp	April	316	9.0	3,477	−4.7
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	May	718	−3.6	3,535†	−3.8
Operating rates	May	88%	97%	91%	97%
Inventories held by U.S. consumers	May 31	1,593	21.4		
Woodpulp shipments (export only)	May	509	−16.0	2,468†	−17.3
Operating rates	May	81%	89%	83%	92%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn. *Includes construction and wet machine grades. †Not annualized. ‡Not directly comparable to year ago because of coding change. (s) = shipments.

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This inflation is disinflation

When the dawn of 1982 emerged in the freezing winds of January, there were few New Year forecasts that anticipated the dramatic decline of inflation rates experienced this year. To move from an era of double-digit Consumer Price Index rises to one in which the index *actually* declined was an unthinkable likelihood.

But the CPI has in fact gone South. No one expects these depressed rates to continue, yet everyone is sure that the hyper-increases of recent years will not be repeated in the near term.

How, then, do we behave in a disinflationary economy if prices do not rise 10% to 15% per year? Real estate will not just automatically double in four to five years (or one to two years if in California). Taxes, which have to pay for the increasing costs of reduced levels of government service, may in fact stabilize or even decline. And the increased real earnings that workers bring home may begin to reflect the purchasing power that inflation robbed workers of during the past decade.

Disinflation and collective bargaining. These two things have already had a dramatic impact on labor agreements in just the first six months of this year.

The last paper mill labor agreement of 1981 had a wage increase of 25% to 26% over three years. By June 1982, settlements were being reached at 6% for each of three years, and companies that had negotiated agreements in 1981 were asking for, and getting, wage deferrals of already negotiated agreements.

These early 1982 settlements reflected the ratcheting downward in expectations of employees and employer. The mood of the country was changing. The Teamsters, rubber workers, and auto workers all negotiated so-called "concession agreements."

The national unemployment rate is currently at 9.5% and trending upward. Hourly compensation, although up by 9.3% in 1981, showed the first year-to-year relative decline in this rate in five years. This trend continued into the first quarter of 1982 when first-year wage increases, which had generally been averaging between 9% and 10%, were reported at the unprecedented rate of 2.2%! This unusually depressed statistic reflected the settlements made in the major smokestack industries of America—rubber, auto, steel, and trucking.

The so-called bellwether unions—the Teamsters, United Auto Workers, and Rubber Workers—all demonstrated an increased willingness to cooperate with management in reducing production costs by agreeing to wage and benefit freezes or reductions and giving back provisions of previously negotiated agreements. It is not unusual that these concessions were made when we recognize that 25% of these industries' workers were currently laid off (see table).

We have also seen the willingness of unions to reopen existing contracts with a view toward reducing the already negotiated wages and benefits in order to permit employers to continue operations. There's no question that jobs are more important than wage increases.

While a painful process, these adjustments taking place on the wage side of the economy are not unusual. They are part of the overall economic "sobering up" process that is taking place in the economy after the excesses of the 1970s. We see not only that the wage earner is affected by this economic squeeze called disinflation, but also that reduced earnings of companies, increasing bankruptcies, and attempts to downsize government and its impact on the private sector all suggest that this process is not one that will be gone in the next year.

In the paper industry, an industry that has seen double-digit settlements over a good part of the past decade, bargaining seems to be producing lower levels of wages and benefits with each turn of the calendar page. Holidays and vacations, which have almost been automatically included in agreements, are no longer being improved. Rather than paying for time not worked, employers are now paying what the marketplace permits them to.

The consequences. According to the Bureau of National Affairs, of the contracts signed in the first quarter of 1982, 42% had work-rule concessions, 39% had holiday concessions, 48% had wage and benefit freezes, and 51% had wage and benefit reductions. While undoubtedly painful, these events reflect an adjustment process in our economy that will hopefully contribute to an economic expansion in the decade ahead.

Industries bargaining 1982
(number of employees)

	1979	1982	% change
Petroleum	60,000	55,000	− 8%
Rubber	53,000	42,000	−21%
Trucking	425,000	300,000	−29%
Auto (GM)	652,000	449,000	−31%

Bleached paperboard:

Slight increase in 1981, but 1982 will be slow

Statistics:	**1980**	**1981**	**1982e**
Production, 000 tons	3862	3910	3700
Capacity, 000 tons	4180	4015	4049
Utilization rate, %[1]	92.4	97.4	90.1
Imports, 000 tons	—	—	—
Exports, 000 tons[2]	606	584	580
Apparent U.S. consumption			
000 tons	3256	3326	3120
lb/capita	29.25	29.56	27.55
000 tons/$billion real GNP (1972)	2.20	2.20	2.06

[1] Because of grade switching, capacity utilization is difficult to define.
[2] Census data.

Grade structure: Solid bleached sulfate (SBS) paperboard is used principally for folding cartons and milk carton stock. A small amount is used for linerboard. Bleached boards are made in a range of calipers, typically 10 pt to 28 pt, and in three levels of apparent density—low, medium, and high. About 50% of the tonnage is coated. Basis weights range from about 120 lb to 300 lb/3000 ft².

Production/capacity: Bleached paperboard production in 1981 rose 1.2% to 3.91 million tons following a decrease in production in 1980 to 3.86 million tons. This figure represents an industry operating rate of 97.4% based on a total capacity of 4.015 million tons. Exports in 1981 decreased 3.6% to 584,000 tons from 606,000 tons exported in 1980. The increase in production offset the lowering of exports and resulted in an increase in apparent U.S. consumption to 3.32 million tons.

Capacity decreased 3.9% in 1981, contributing to the higher operating rate. Industry capacity for SBS is difficult to define since some machines also made bristols, board, and market and fluff pulps, and when demand for market pulp is strong, mills switch their grade mix to take advantage of higher margins. Thus, actual industry capacity is higher than reported. From 1970 to 1980, production increased at a 1.01 rate, and capacity grew at a 1.7% average annual rate. Industry capacity will remain mostly flat through 1984 at about 4.04 million tons.

Outlook: The SBS paperboard market outlook depends on a number of factors—export markets, folding carton market share, and new market penetration—so is difficult to forecast.

The export market for SBS board, which has grown substantially in recent years, particularly in milk carton stock, is forecast to decrease slightly in 1982. But this remains a major potential growth area in 1983 and beyond. Many world markets are switching from glass bottles to milk cartons, which will maintain a high demand for SBS in offshore markets.

Domestic liquid packaging applications, which have been declining recently (particularly for milk cartons), are leveling off. Several sectors, such as juice cartons, are potential growth areas. And a new product in the milk carton market—gallon packages consisting of two half-gallon containers—could regain some lost market share. Another growth area is hot-fill beverage cartons which extend shelf life without refrigeration.

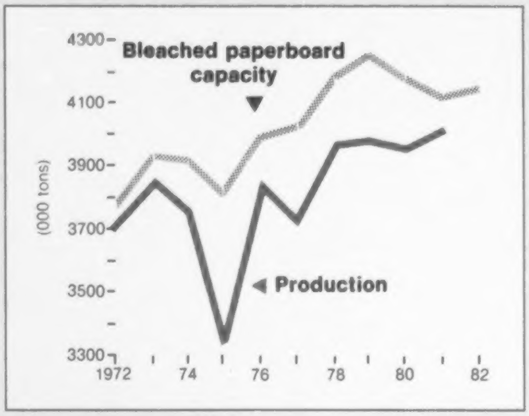
Ovenable paperboard is another area that looks promising, particularly if microwave oven sales continue to grow. This is currently a small market in terms of tonnage.

However, with nondurable spending expected to be weak in 1982, and increased competition from recycled folding grades benefitting from low wastepaper prices, SBS folding carton market share will be tough to hold. Demand for SBS from the fast-food sector has been a solid area and has recently grown. But depressed resin prices have resulted in intense competition from plastics in cupstock, plates, and trays.

Pricing: Dollar value of SBS has more than doubled since 1972. Prices increased 6% to 7% in June and July of 1981 and this increase has held, although some discounting has occurred.

Approximate price history for 15-pt coated SBS board in $/short ton at year end: 1972, 192; 1973, 250; 1974, 350; 1975, 355; 1976, 385; 1977, 405; 1978, 445; 1979, 490; 1980, 518; 1981, 625; 1982e, 625.

Markets: Approximate end-uses for SBS board are: 43% folding carton; 22% milk carton; 11% cup and container; 11% export; 7% plate, dish, tray; 2% linerboard; and 4% other packaging and nonpackaging uses.



Estimated capacities of major U.S. companies are:

	Annual capacity (000 tons)	Capacity share (%)
1. International Paper Co.	950	23.5
2. Potlatch Corp.	508	12.5
3. Westvaco Corp.	410	10.1
4. Continental Forest Industries	370	9.1
5. Federal Paper Board Co.	330	8.1
6. Temple-Eastex Inc.	310	7.7
7. Champion International	245	6.1
8. Weyerhaeuser Co.	200	4.9
9. James River[1]	200	4.9
10. Container Corp. of America	170	4.2
11. Georgia-Pacific Corp.	150	3.7
12. Gilman Paper Co.	150	3.7
13. Gulf States Paper Corp.	150	3.7
14. Mead Corp.	110	2.7
15. Union Camp Corp.	90	2.2
16. St. Regis Paper Co.	50	1.2

[1] Formerly American Can Co.

U.S. capacity (1982): **4.049 million tons**
Capacity share of top five companies: 63.4%
Capacity share of top ten companies: 91.2%

World Review

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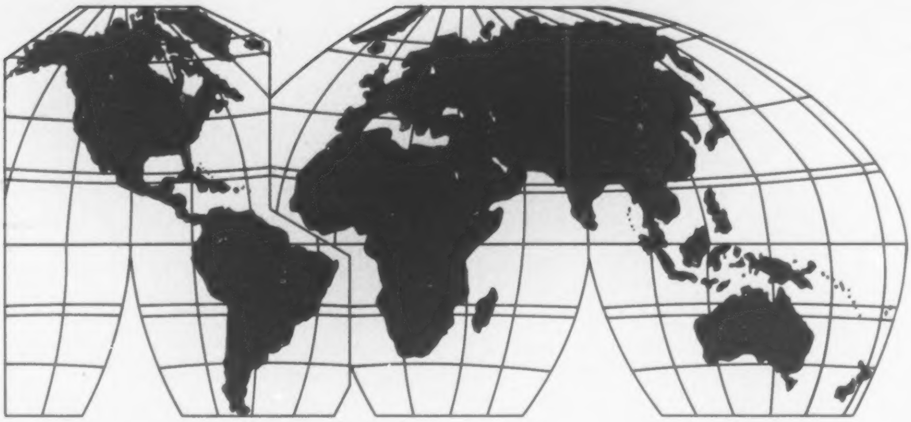


WORLDWIDE PULP/PAPER INDUSTRY: less output, lower profits in 1981

Decline set in at midyear after early good start; worldwide paper/board output rose slightly but pulp production, operating rates, and profits fell

By MARTIN BAYLISS and PETER SUTTON, International Editors

☐ The promise of the early months of 1981 turned to disappointment as the year progressed. As in 1980, high U.S. interest rates slowed progress in the North American economy. The effects spread worldwide, bringing recession to nearly every industrial country and slowing down growth in even the most dynamic of the developing nations.

Pulp and paper suffered along with the rest of the world economy. Markets and prices weakened progressively as the year went on, and the slide speeded up in the early part of 1982, leading to the worst crash in pulp prices since the unfortunate events of 1976-77.

In 1981, output of paper and board worldwide rose by 0.3% to about 171 million metric tons*; while pulp production fell by 0.6% to about 131 million tons. It seems likely that real consumption for paper and board gained more than these figures would indicate but that destocking in the face of high interest rates reduced demand.

End-users of pulp, paper, and board ran down their stocks during the year as far as they could in a process that has continued in 1982. In midyear, inventories may be as low as they can go and any upturn is expected to have an immediate and substantial effect on demand.

Market pulp stocks at producer mills have risen by a very large amount in the past year, however, and by the end of May 1982 stood at over 1.8 million metric tons in the Norscan group of countries; this is 700,000 tons more than 12 months earlier. Brazilian stocks were also believed to be much higher than a year ago. *(Continued)*

** In this review, data from all countries, including the U.S., conform with FAO definitions. Thus, paper/board totals do not include insulation board; pulp figures exclude screenings, defibrated, and exploded pulps.*

Production by continents, world total (000 metric tons)

	PULP				
	1960	**1970**	**1979**	**1980**	**1981**
North America	32,964	54,912	64,554	65,969	66,434
Europe	20,965	34,853	39869	40,235	39,983
Asia/Australasia	5,156	14,268	16,719	18,239	17,094
Latin America	821	2,224	4,766	5,848	5,789
Africa	124	900	1,369	1,502	1,652
World total	**60,031**	**107,157**	**127,277**	**131,793**	**130,952**

	PAPER AND PAPERBOARD				
	1960	**1970**	**1979**	**1980**	**1981**
North America	38,917	58,914	71,029	70,225	71,295
Europe	25,634	45,159	59,024	59,023	59,193
Asia/Australasia	7,861	20,621	30,774	31.962	31,186
Latin America	1,656	3,712	7,754	7,737	7,578
Africa	288	892	1,617	1,717	1,813
World total	**74,355**	**129,298**	**170,198**	**170,664**	**171,065**

Global pulp, paper, and board capacity rose sharply in 1981. Paper and board capacity rose by at least seven million metric tons to a little over 200 million tons. Pulp capacity went up by a little less to 154 million tons total.

The combination of stagnant or declining production and the sizable increase in capacity led to a significant slowdown in operating rates. For pulp and for paper/board, they fell to around 85% worldwide, a clear decline from 1980 levels.

Paper and board production. In North America, output rose by a million metric tons, and by a small amount in Africa and parts of Western and Eastern Europe. But in the European Economic Community (EEC), Asia, and Latin America there were declines from 1980 levels.

Western Europe as a whole was one of the regions where output fell last year. This was entirely the result of a 300,000-ton decline in the EEC, which outbalanced small rises in Scandinavia and the rest of the region.

The main drop came in the U.K., which had suffered the closure of dozens of machines in 1980 and entered 1981 with capacity down by almost 20% from the previous year's level. But there were notable drops, too, in Italy and the Netherlands, both of which have had deep-reaching problems of their own.

Sweden also lost some ground, but the rest of Western Europe showed modest gains all around. In Eastern Europe, 1981 was not too bad and most countries registered good gains. The one exception was Poland, where the political upheavals led to a drop of 12%-13% in output.

Japanese production dropped by 1.1 million tons in 1981 and there was a small downturn in the Philippines. In every other major country there were gains in 1981, though growth was not so rapid as usual. But the increases elsewhere were not nearly enough to compensate for the losses in Japan.

Total output was also down in Latin America, where Brazilian and Argentine production was off sharply, while Chile and Uruguay also lost some ground. There were moderate increases elsewhere, with Mexico leading the way; but, as in Asia, the rate of growth was lower than normal.

Very little accurate information is available on African production, largely because there is so little of it. South Africa, which makes about two-thirds of the continent's paper and board, enjoyed a good year with a strong upturn, but elsewhere little progress was made.

Worldwide, the one paper grade to register a significant increase in output in 1981 was newsprint. A number of large new machines started up in 1980-81, notably in North America, and production rose by almost a million metric tons to 26.6 million tons. In North America alone, output was up by 800,000 metric tons.

In the case of printing/writing papers, the 1981 drop in production came despite installation of several large new machines in the last couple of years. This suggests that many smaller machines were closed down—which indeed appears to be the case, though it is not clear how many were for printing/writing grades.

In Western Europe alone, over 80 paper and board mills shut last year; at least 50 in EEC countries, 11 in Scandinavia, and roughly 20 in the rest of Western Europe. A further 70 shut down in North America. Elsewhere, figures indicate that another 50 or so are thought to have closed.

Pulp decline. Total world pulp production fell by over 800,000 metric tons in 1981, largely as a result of the serious deterioration in the Japanese industry and the somewhat less dramatic reduction in EEC output.

In Japan, production fell by nearly 1.3 million tons or almost 14% from 1980 levels, while in the EEC output dropped by a little over 400,000 tons or about 7%. North American output was up by half a million tons (less than 1%), and African by 150,000 tons (10%), while elsewhere there was relatively little change.

Output of mechanical pulp rose by half a million metric tons in 1981 compared to 1980. This was no doubt largely due to the increase in newsprint production. Output of chemical and other grades of pulp fell from the previous year's total, however.

Pulp production expressed as a percentage of paper and board production also declined in 1981, continuing a long-term trend. The percentage of pulp to paper and

World's top 20 producing and consuming countries

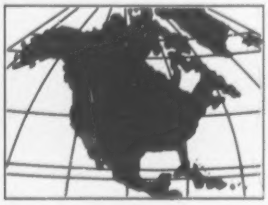
PAPER AND BOARD PRODUCTION (000 metric tons)			PULP PRODUCTION (000 metric tons)			PER CAPITA CONSUMPTION (lb/yr)		
	1981	**1980**		**1981**	**1980**		**1981**	**1980**
1. United States	57,765	56,836	1. United States	47,159	46,025	1. United States	590	600
2. Japan	16,980	18,088	2. Canada	19,275	19,944	2. Sweden	441	452
3. Canada	13,530	13,389	3. U.S.S.R.	9,060	8,950	3. Finland	437	357
4. U.S.S.R	8,955	8,732	4. Japan	8,612	9,788	4. Canada	434	474
5. Fed. Rep. Germany	7,795	7,580	5. Sweden	8,529	8,699	5. Switzerland	366	370
6. Finland	6,135	5,919	6. Finland	7,331	7,234	6. Denmark	359	359
7. Sweden	6,131	6,189	7. China	5,080	5,190	7. Fed. Rep. Germany	346	342
8. China	5,400	5,350	8. Brazil	3,500	3,507	8. Netherlands	340	342
9. France	5,148	5,151	9. Fed. Rep. Germany	2,021	1,995	9. Japan	315	337
10. Italy	4,844	4,935	10. France	1,715	1,829	10. Norway	311	309
11. United Kingdom	3,381	3,793	11. Norway	1,608	1,494	11. Belgium	311	304
12. Brazil	3,297	3,468	12. Spain	1,364	1,329	12. Australia	302	320
13. Spain	2,588	2,566	13. Austria	1,210	1,229	13. New Zealand	298	282
14. Mexico	1,950	1,895	14. New Zealand	1,160	1,147	14. United Kingdom	273	269
15. Korea, Republic of	1,783	1,693	15. South Africa	1,122	1,012	15. France	254	256
16. Netherlands	1,683	1,714	16. Italy	962	1,075	16. Austria	238	236
17. Austria	1,671	1,616	17. Portugal	895	865	17. Ireland	205	205
18. Taiwan	1,498	1,479	18. Czechoslovakia	880	855	18. Iceland	201	183
19. Australia	1,394	1,471	19. Romania	815	815	19. Italy	192	192
20. Norway	1,373	1,373	20. Chile	743	763	20. Israel	181	174

board produced in 1980 was 77.3%, but in 1981 it dropped to 76.6%.

The one significant upward movement in 1981 came in wastepaper consumption, which increased by 2.7% to over 49 million metric tons. Worldwide, wastepaper now represents nearly 29% of paper and board production. Some five million tons of wastepaper were traded.

The recession exerted strong downward pressure on the industry's capital investment programs. Announcements of major new projects were scarce throughout the world, and several programs which had seemed well underway back in 1980 suddenly appeared less likely to be realized.

The *PPI Projects Survey 1982-85*, published in mid-1982, reported a slower capacity growth for this three-year period than in earlier annual surveys. Estimates for the 1982-85 term are for 12.6 million annual metric tons worldwide of new paper and board capacity to be added by confirmed projects (orders actually placed) and 11.1 million annual tons of new pulp capacity. Projects in the advanced planning stage should add another 4.1 million tons of paper/board and 2.5 million tons of pulp, according to the *PPI* survey.



NORTH AMERICA

LEADING NORTH AMERICAN companies saw 1981 profits drop for the second year running, though weakness in the wood products sector had a worse effect than any decline in pulp and paper sales. Demand for wood products fell because of the poor state of the construction industry in North America.

Paper and board production in U.S. and Canada totaled 71.3 million metric tons in 1981, a rise of 1.5% from 1980. In the U.S. there were small output increases for almost all paper grades, but board production fell by 100,000 tons from the 1980 level. Canadian end-of-year figures showed declines of a similar size in printing/writing and linerboard production.

Unsurprisingly, the North Americans remain the top producers in the world. In 1981 their share of world output was 42% of total paper and board and 51% of pulp. Pulp production in 1981 was 0.7% higher than in 1980, at 66.4 million metric tons. However, the performance of Canadian and U.S. pulp mills differed. While Canadian production fell (due primarily to labor disputes) to 19.3 million tons, a drop of 3.4%, U.S. mills increased output by 2.5% to 47.2 million tons.

North American production of newsprint, which is the Canadian industry's most important export, increased by 6.5% in 1981 to reach a new record of 13.7 million metric tons—over 50% of the world's total output. Canada's exports to the U.S. were down nearly 1% at 6.06 million tons, while its overseas exports increased by 18.6% to 1.81 million tons. This could mark the beginning of a shift in Canadian newsprint exports, with greater concentration on overseas markets rather than with the U.S., now the major trading partner.

Linerboard exports from North America in 1981 dropped 23% to 2.6 million metric tons. This was due largely to weakening in exports from U.S., which exports more than eight times as much liner as Canada. The American Paper Institute attributes the fall to such factors as Western Europe's recession (U.S. exports to that area were down more than 30%), the strength of the U.S. dollar, and the cut in imports by People's Republic of China (from the substantial quantity in 1980).

Market pulp sales. Weakening demand on the international pulp market throughout the second half of 1981 brought North American pulp exports down 6.7% to 9.9 million metric tons. The weakness has continued in 1982.

Canadian exports to the U.S. in 1981 were down 5.6% to 3.24 million metric tons. North American overseas exports fell by 7% to 6.6 million tons. These figures tie in with the rise in market pulp inventories and downtime at some Canadian mills taken to reduce stock levels. Canada's market pulp production in 1981 was 6.6 million tons, a drop of 8.6%. This results in an annual operating rate of 88%—more than 10% below the 1980 rate.

EUROPE

WESTERN EUROPE IN 1981 endured a difficult year, as economic growth slowed down almost to a stop, while unemployment continued to rise. In Eastern Europe, economic growth continued at reasonable levels but here, too, the worldwide recession did nothing to improve performance.

In most of Western Europe, governments maintained tight controls over spending in an attempt to keep inflation under control. The main exception was France, where the election of Francois Mitterrand's Socialist government led to reflationary policies designed to create demand and jobs.

The paper industry's progress faithfully reflected the rest of the economy. Total Western European paper and board production fell by 19,000 metric tons, to 47.7 million tons, while pulp output declined by a little over 300,000 tons to 27.7 million tons.

The key event of the year as far as the paper industry was concerned was undoubtedly the rise of the U.S. dollar on international money markets. Its value increased dramatically against every European currency, swinging the pendulum back in favor of the integrated paper and board producer.

In 1982 the dollar has strengthened still further, squeezing U.S. suppliers of pulp and kraftliner out of their traditional strongholds. Indeed, prices expressed in dollars fell so low by mid-1982 that North Americans were said to be selling marginal quantities of some products at below cost.

Estimates of production costs for chemical pulp in North America and Scandinavia show that the very considerable advantage the Americans used to enjoy has now disappeared. Wood costs are still lower in North America but cheaper energy and labor in Sweden outweigh more expensive raw materials.

The strength of the dollar has hurt nonintegrated paper producers in the European Economic Community as

1980-81 WORLD PULP, PAPER, AND

	Population (1,000)	Number of mills		Capacity (1,000 m tons)		Per capita (lb)	P & B consumption		Pulp consumption		Production (1,000 m tons) P & B		Pulp	
		P & B	Pulp	P & B	Pulp		1980	1981	1980	1981	1980	1981	1980	1981
EUROPE														
Belgium	9,900	17	3	905	400	311	1,370	1,391	608	591	864	887	359	337
Denmark	5,150	6	3	318	133	359	832	842	152	165	253	268	120	117
France	54,000	172	28	5,500	2,000	254	6,220	6,231	3,309	3,212	5,151	5,148	1,829	1,715
Germany, Fed. Rep.	61,666	200	37	10,028	2,322	346	9,642	9,585	4,331	4,334	7,580	7,795	1,995	2,021
Greece	9,450	18	4	355	65	96	428	410	154	148	320	300	54	48
Ireland	3,200	2	0	70e	0	206	299	299	30	30	55	55e	10	19e
Italy	57,180	480	55	5,850	1,350	192	5,244	4,986	2,691	2,419	4,935	4,844	1,075	962
Netherlands	14,246	35	5	1,880	212	340	2,201	2,193	814	716	1,714	1,683	206	162
UK	55,950	117	3	3,900	180	273	6,837	6,781	1,869	1,896	3,793	3,381	286	140
EEC	**270,742**	**1,047**	**138**	**28,806**	**6,662**	[illegible]	**33,073**	**32,718**	**13,968**	**13,312**	**24,666**	**24,361**	**5,843**	**5,521**
Finland	4,800	46	52	7,025	8,510	437	1,167	1,342	5,331	5,682	5,919	6,135	7,234	7,331
Norway	4,093	23	27	1,650	1,945	311	497	522	1,329	1,463	1,373	1,373	1,494	1,608
Sweden	8,330	58	64	6,860	9,625	441	1,842	1,688	5,763	5,786	6,189	6,131	8,699	8,529
Scandinavia	**17,223**	**127**	**143**	**15,535**	**20,080**	[illegible]	**3,506**	**3,562**	**12,423**	**12,820**	**13,481**	**13,639**	**17,427**	**17,468**
Austria	7,508	36	22	1,911	1,356	229	838	627	1,155	1,149	1,616	1,671	1,229	1,210
Iceland	232	0	0	0	0	201	20	21	0	0	0	0	0	0
Malta	350	0	0	0	0	68	11	11	0	0	0	0	0	0
Portugal	9,905	108	8	650	1,000	112	452	501	461	464	535	569	865	895
Spain	37,500	212	35	3,108	1,652	164	2,669	2,631	1,416	1,423	2,566	2,588	1,329	1,364
Switzerland	6,370	29	5	1,030	320	366	1,064	1,060	551	549	914	920	285	296
Other W. Europe	**61,865**	**386**	**70**	**6,690**	**4,328**	**170**	**5,054**	**5,061**	**3,583**	**3,586**	**5,631**	**5,748**	**3,708**	**3,765**
Total W. Europe	**349,830**	**1,560**	**351**	**51,040**	**31,070**	[illegible]	**41,823**	**41,321**	**28,984**	**28,818**	**43,777**	**43,748**	**27,078**	**26,754**
Albania	2,750	4	4	10e	10e	11	14	14	8	8	8	8	8	8
Bulgaria	8,903	20	na	450	280	123	495	523	327	337	395	420	234	240
Czechoslovakia	15,450	49	24	1,282	1,031	166	1,176	1,160	932	977	1,208	1,225	853	880
German Dem. Rep.	16,740	21	19	1,250	700	179	1,378	1,350	826	791	1,237	1,248	686	679
Hungary	10,700	10	6	na	na	141	632	383	294	288	440	457	111	112
Poland	36,100	53	26	1,436	934	76	1,426	1,217	999	864	1,277	1,118	821	711
Romania	22,000	20	11	870	850	71	684	684	849	849	805	805	815	815
USSR	268,800	84	56	10,000	9,450	73	8,731	8,905	8,127	8,115	8,732	8,955	8,950	9,060
Yugoslavia	22,354	30	21	1,275	750	116	1,106	1,169	821	838	1,144	1,199	679	724
E. Europe	**403,797**	**291**	**167**	**16,573**	**14,006**	**84**	**15,842**	**15,406**	**13,163**	**13,067**	**15,246**	**15,436**	**13,157**	**13,229**
Total Europe	**753,627**	**1,850**	**518**	**67,613**	**45,075**	**166**	**57,275**	**56,726**	**43,147**	**42,886**	**59,023**	**59,203**	**40,235**	**39,983**
NORTH AMERICA														
Canada	24,200	112	36	15,600	23,100	434	4,549	4,763	12,895	12,821	13,389	13,530	19,944	19,275
USA	229,700	612	248	66,007	52,980	591	60,550	61,590	46,248	47,529	56,836	57,765	46,025	47,159
North America	**253,900**	**724**	**284**	**81,607**	**76,080**	**576**	**65,099**	**66,353**	**59,143**	**60,350**	**70,22"**	**71,295**	**65,969**	**66,434**
ASIA														
Afghanistan	15,800	0	0	0	0	0	5F	5e	0	0	0	0	0	0
Bangladesh	91,000	7	8	163	152	2	66	75	79	66	76	70	72	60
Bhutan	1,300	0	0	0	0	—	na	na	0	0	0	0	0	0
Burma	33,590	4	2	na	na	2	35	35e	17	17e	10	10e	17	17
Cambodia	8,870F	0	0	0	0	2	6F	6e	0	0	0	0	0	0
China, People's Rep.	988,000	1,600	na	6,300	5,600	13	5,882	5,208e	5,606	5,080e	5,350	5,400	5,190	5,080
Cyprus	630	0	0	0	0	174	50	50e	0	0	0	0	0	0
Hong Kong	5,200	2	0	30	0	265	600	623	1	0	12	23	0	0
India	660,000	159	264	1,816	1,500	4	1,488	1,523	0	0	1,088	1,148	na	na
Indonesia	147,000	31	14	370	1	9	513	546	81	171	232	250	81	81
Iran	40,000	17	2	330	260	31	608	540	75	150	111	129	75	100
Iraq	13,080	2	2	144	90	20	115	na	41	41	57	0	26	21e
Israel	3,976	5	0	155	na	181	315	326	60	65	126	137	0	0
Japan	117,890	593	66	22,473	12,788	315	17,926	16,795	11,904	10,206	18,088	16,980	9,788	8,612
Jordan	2,500	1	0	8	0	44	28	35	0	0	0	6	0	0
Korea, People's Rep.	19,000	6	2	100e	20	11	88	88	45	45e	80e	80e	45e	45e
Korea, Rep. of	38,723	170	5	2,180	314	93	1,561	1,640	654	742	1,693	1,783	186	222
Kuwait	1,370	0	0	0	0	84	52F	52e	0	0	0	0	0	0
Laos	3,770	0	0	0	0	—	1F	1e	0	0	0	0	0	0
Lebanon	3,160	3	0	20e	0	53	76F	76e	0	0	12	12e	0	0
Malaysia	13,923	12	na	100	na	71	445	445	4	4e	75	75e	na	na
Mongolia	1,670	0	0	0	0	11	8F	8e	0	0	0	0	0	0
Nepal	14,608	1	1	2F	2e	2	10	10e	2	2e	2F	2e	2	2e
Pakistan	82,500	17	17	120	95	4	171	212	63	102	89	102	55	90
Philippines	49,150	18	10	483	256	20	457	441	223	179	334	325	171	154
Saudi Arabia	9,292	0	0	0	0	24	102F	102e	0	0	0	0	0	0
Singapore	2,443	3	0	na	na	148	140	164	4,469	3,109	na	na	0	0
Sri Lanka	14,800	1	2	38	25	9	50	63	16	19	21	24	12	12
Syria	8,980	3	0	64	0	20	82	82e	0	0	3	3e	0	0
Taiwan	18,100	160	3	1,900	450	172	1,412	1,403	304	335	1,479	1,498	276	350
Thailand	47,875	34	7	458	150	24	471	527	145	169	355	394	63	69
Turkey	46,000	13	12	716	548	29	523	570	337	323	470	514	287	319
United Arab Emirates	900	0	0	0	0	—	na	na	0	0	0	0	0	0
Vietnam	52,300	55e	50e	147	107	2	45	53	33	36	45e	53e	33e	36e
Yemen Arab. Rep.	5,393	0	0	0	0	—	na	na	0	0	0	0	0	0
Yemen Dem. Rep.	1,863	0	0	0	0	2	2F	2e	0	0	0	0	0	0
Asia	**2,564,656**	**2,917**	**470**	**38,117**	**22,358**	[illegible]	**23,264**	**21,737**	**14,169**	[illegible]	**29,806**	**29,024**	**16,379**	**15,270**

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na = not available. e. = estimate. F = FAO estimate.

BOARD INDUSTRY AT A GLANCE

	Population (1,000)	Number of mills		Capacity (1,000 m tons)		Per capita (lb)	P & B consumption		Pulp consumption		Production (1,000 m tons) P & B		Pulp	
		P & B	Pulp	P & B	Pulp		1980	1981	1980	1981	1980	1981	1980	1981
AUSTRALASIA														
Australia	14,900	17	16	1,730	875e	[illegible]	2,099	2,045	997	911	1,471	1,494	713	669
Fiji	634	0	0	0	0	[illegible]	9	9e	0	0	0	0	0	0
New Zealand	3,195	5	6	798	1,385	[illegible]	399	416	683	662	683	711	1,147	1,160
Papua New Guinea	3,600	0	0	0	0	4	6	6e	0	0	0	0	0	0
Samoa	160	0	0	0	0	na	na	na	0	0	0	0	0	0
Australasia	**22,489**	**22**	**22**	**2,528**	**2,290**	[illegible]	**813**	**2,476**	**1,870**	**1,863**	**2,154**	**2,105**	**1,860**	**1,819**
LATIN AMERICA														
Argentina	28,138	89	16	1,013	529	[illegible]	933	848	464	427	705	656	338	299
Bahamas	240	0	0	0	0	9	1F	1e	0	0	0	0	0	0
Barbados	279	0	0	0	0	40	5	5e	0	0	0	0	0	0
Belize	160	0	0	0	0	22	16	16e	0	0	0	0	0	0
Bolivia	5,600	2	0	na	0	7	19	19e	0	0	1F	1e	0	0
Brazil	122,000	160	48	4,000	3,900	64	3,466	3,233	2,796	2,762	3,468	3,297	3,507	3,500
Chile	11,390	18	7	379	613	56	299	325	327	359	327	320	763	743
Colombia	28,000	26	7	509	246	37	441	452	238	264	367	369	206	204
Costa Rica	2,307	2	1	15	5	110	26	22	10	7	13	12	5	5
Cuba	10,000	9	3	150	60	48	214	214	83	83	97e	97e	45e	45e
Dominican Republic	5,551	2	0	45e	0	13	36	36e	4	4e	9F	9e	0	0
Ecuador	8,350	9	5	60	30	24	94	94	44	44	54	54e	24	24e
El Salvador	4,810	3	0	40	na	33	64	43	0	0	20	20	0	0
Guatemala	75,000	3	0	48	na	40	89	93	25	30	45	48	0	0
Guyana	832	0	0	0	0	18	7F	7e	0	0	0	0	0	0
Haiti	5,740	0	0	0	0	2	6F	6e	0	0	0	0	0	0
Honduras	3,670	0	0	0	0	33	54F	54e	0	0	0	0	0	0
Jamaica	2,215	1	0	6e	0	55	39	39e	0	0	1F	1e	0	0
Mexico	70,000	60	27	2,556	993	79	2,430	2,519	939	866	1,895	1,950	731	743
Neth. Antilles	247	0	0	0	0	28	3F	3e	0	0	0	0	0	0
Nicaragua	2,500	0	0	0	0	28	36	30e	0	0	0	0	0	0
Panama	2,000	3	0	20	na	[illegible]	83	78	0	0	18	18	0	0
Paraguay	3,117	2	0	na	0	11	17F	17e	0	0	1F	1e	0	0
Peru	17,780	13	4	na	na	22	172	176	171	171	159e	163e	140e	140e
Surinam	355	0	0	0	0	84	13F	14e	0	0	0	0	0	0
Trinidad & Tobago	1,150	0	0	0	0	[illegible]	34F	34e	0	0	0	0	0	0
Uruguay	2,900	12	5	70	28	55	76	71	35	30	64	51	26	23
Venezuela	16,459	14	3	706	160	[illegible]	747	764	380	380	501	518e	63	63e
Latin America	**297,203**	**425**	**126**	**9,617**	**8,764**	[illegible]	**9,427**	**9,234**	**5,880**	**5,418**	**7,747**	**7,588**	**5,848**	**5,788**
AFRICA														
Algeria	19,700	5	3	133e	99e	18	162	162	57	57	77F	77e	24F	24e
Angola	7,080	3	1	40e	44e	9	28	28	35	35	14F	14e	35F	35e
Benin	3,570	0	0	0	0	2	3	3e	0	0	0	0	0	0
Botswana	820	0	0	0	0	—	na	na	0	0	0	0	0	0
Burundi	4,510	0	0	0	0	—	na	na	0	0	0	0	0	0
Cameroon	8,400	0	1	0	120	7	27	27	0	0	5F	5e	120	120e
Central African Rep.	2,284	0	0	0	0	—	na	na	0	0	0	0	0	0
Chad	4,508	0	0	0	0	—	na	na	0	0	0	0	0	0
Congo	1,540	0	0	0	0	2	1F	1e	0	0	0	0	0	0
Egypt	41,300	12	3	186	78	16	315	321	0	39	137	137	na	39
Ethiopia	32,600	2	na	10e	na	—	12	5	4	4	7F	4e	4F	4e
Gabon	585	0	0	0	0	4	1F	1e	0	0	0	0	0	0
Gambia	600	0	0	0	0	—	na	na	0	0	0	0	0	0
Ghana	11,742	0	0	0	0	2	8F	8e	0	0	0	0	0	0
Guinea	5,300	0	0	0	0	—	na	na	0	0	0	0	0	0
Ivory Coast	7,970	0	0	0	0	9	33F	33e	0	0	0	0	0	0
Kenya	16,400	1	1	55e	45e	9	65	65	15	15	48F	48e	15F	15e
Lesotho	1,340	0	0	0	0	—	na	na	0	0	0	0	0	0
Liberia	1,860	0	0	0	0	4	4e	4e	0	0	0	0	0	0
Libya	2,980	2	0	10e	na	11	14	14	0	0	5F	5e	0	0
Madagascar	9,000	1	1	30	5	2	12	11	0	4	9	8	na	4
Malawi	6,173	0	0	0	0	4	16	11e	0	0	0	0	0	0
Mali	6,910	0	0	0	0	—	1F	1e	0	0	0	0	0	0
Mauritania	1,630	0	0	0	0	—	na	na	0	0	0	0	0	0
Mauritius	960	0	0	0	0	11	5F	5e	0	0	0	0	0	0
Morocco	20,400	8	1	120	100	18	175	161	43	50	101	99	83	81
Mozambique	10,470	2	0	10e	na	4	19	19	0	0	2F	2e	0	0
Niger	5,346	0	0	0	0	—	na	na	0	0	0	0	0	0
Nigeria	85,000	3	3	14e	na	4	141	141	10	10	14e	14e	na	na
Rwanda	5,050	0	0	0	0	—	na	na	0	0	0	0	0	0
Senegal	5,660	0	0	0	0	4	17F	17e	0	0	0	0	0	0
Sierra Leone	3,470	0	0	0	0	—	na	na	0	0	0	0	0	0
Somalia	3,650	0	0	0	0	4	7F	7e	0	0	0	0	0	0
South Africa	29,360	16	10	1,321	1,193	[illegible]	1,314	1,368	840	944	1,200	1,268	1,012	1,122
Sudan	18,300	3	0	na	0	2	12	12	3	3	2F	2e	0	0
Swaziland	520	1	1	0	175	4	1	1	6	2	na	na	162	159
Tanzania	17,400	1	0	4e	na	2	23	23	0	0	3e	3e	0	0
Togo	2,563	0	0	0	0	—	1	1e	0	0	0	0	0	0
Tunisia	6,300	4	1	35	24	22	58	64	19	27	32	34	20	22
Uganda	13,225	1	0	2e	na	—	5	6	0	0	1F	1e	0	0
Upper Volta	6,910	0	0	0	0	—	1	1e	0	0	0	0	0	0
Zaire	28,090	1	0	2e	na	—	8	8	0	0	2F	2e	0	0
Zambia	6,052	1	1	16	14	7	17	16	0	0	0	16	na	na
Zimbabwe	7,480	2	2	na	na	18	58	58	32	32	58	58e	27	27e
Africa	**483,881**	**69**	**29**	**1,988**	**1,897**	[illegible]	[illegible]	**2,807**	**1,064**	[illegible]	**1,717**	**1,813**	**1,502**	**1,652**
WORLD TOTAL	**4,376,256**	**5,985**	**1,427**	**201,470**	**154,434**	[illegible]	**170,227**	**168,125**	**134,763**	**122,268**	**170,674**	**171,108**	**131,783**	**130,947**

well as North American suppliers. Despite the drop in apparent pulp prices to a mid-1982 level of $500 less discounts for bleached softwood kraft, the price in local currency may have risen by up to 30% since 1980.

And most producers throughout Western Europe are unhappy with their profits. Even in Sweden, whose currency has dropped by 38% against the dollar since 1980, most producers do not seem to expect significant profits in 1982.

The decline in European paper and board production in 1981 was mainly concentrated in the EEC. Output fell by over 300,000 metric tons, to 24.3 million tons—the second successive annual decline. Imports from non-EEC countries rose by 4% to 9.6 million tons, while exports went up by 4.7% to 1.1 million tons. Apparent consumption thus fell very slightly to 32.5 million tons.

The drop in output was not equally spread over all the ten member EEC states. In Fed. Rep. Germany, production rose by some 200,000 metric tons to just under eight million tons, a new record. In Belgium and Denmark, too, there were moderate increases.

The remaining producers all reported lower production than in 1980, though for some of them the change was statistically negligible. Two countries accounted for most of the drop: in the U.K., output fell by 400,000 metric tons, to 3.4 million tons; and in Italy, by 100,000 tons, to 4.8 million tons.

Mills continued to close, including some quite large ones, though at a somewhat slower pace than in 1980. Still, over 50 paper and board mills shut down in 1981, leaving 1045 mills at the end of the year. The closures included about 20 mills in Italy and 18 in U.K., with fewer mills in France, Belgium, Holland and Germany.

Despite the closures, total annual capacity remained about the same, at 28.7 million metric tons. Thus the average mill size increased from 26,000 to 27,500 tpy. Excluding Italy (which has nearly half the EEC's mills, many of them very small), the average mill size is now just over 40,000 tpy.

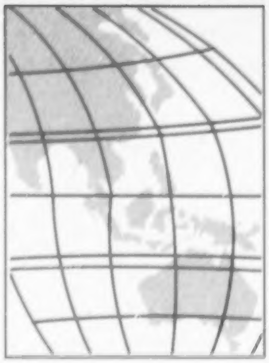
Pulp production and capacity in EEC also continued to drop during 1981. Production fell by over 7% to 5.5 million metric tons, with capacity reduced by a little over 300,000 tons to 6.7 million tons. Operating rates therefore were only 82%, slightly below the world average despite the very small amount of market output involved.

Over 20 pulp mills also shut down during the year, 15 of them in Italy. The average size of EEC pulp mills thus increased from 44,000 to 48,000 metric tpy.

In Scandinavia, 1981 was a better year—though far from satisfactory. Finnish pulp, paper, and board production rose by a reasonable margin, but there were substantial declines in Sweden. In Norway, paper/board output remained at the 1980 level while pulp production rose sharply (largely thanks to increased tonnage coming from the new Tofte mill).

In the rest of Western Europe, paper and board production rose by about 100,000 metric tons to 5.7 million tons, while pulp output went up by a small margin to 3.8 million tons. Still, weak demand affected the industry in those countries and few, if any, companies made satisfactory profits.

In Eastern Europe as a whole, paper and board production rose by nearly 200,000 metric tons in 1981, to 15.4 million tons, while pulp output went up almost 100,000 tons, to 13.2 million tons. If Poland's results are excluded, the upturn was a good deal more impressive.



ASIA/AUSTRALASIA

TOTAL ASIAN PAPER and board output in 1981 was just under 29 million metric tons, 2.5% down from 1980 and the first fall in production for many years. Australasia fared little better, with output dropping 2.3% to 2.11 million tons.

The reason for the decline in Asia was performance of the Japanese industry. Weak domestic demand and signs of a drop in exports forced Japanese manufacturers to cut back production and link it very closely to shipments. As a result, output was down by around one million metric tons, or 6.1%, for a total of 17 million tons.

Japan was the only one of the big five Asian producing nations to see a drop in production. Chinese output increased marginally (0.9%) to 5.4 million metric tons; Republic of Korea increased its paper/board output by 5.3% to 1.78 million tons; Taiwan's production went up by 1.3% to nearly 1.5 million tons; India's output was 1.15 million tons, up 5.5%. These five countries account for over 90% of total Asian production (excluding U.S.S.R.).

This is the first time since 1975 that annual production has been below the previous year. It also clearly shows the dominating position of Japan, which despite capacity cutbacks still made 57% of Asia's total paper/board in 1981.

Strict measures to cut overcapacity and hold production to demand are expected to be followed for most of 1982 by the Japanese industry, whose actions also affect others in the region—particularly those relying on pulp and woodchip exports to Japan.

Three of the other big producers—India, Taiwan and Korea—managed to raise production over the 1980 level, even though affected by similar problems, such as rising raw material and energy costs, and weak paper prices.

In People's Republic of China, paper/board capacity is expected to expand steadily and slowly, but demand exceeds production by so much that imports of paper and board will continue. The country's fiber shortage is also likely to require continuing pulp imports. Imports from U.S. in 1981 were 157,000 metric tons, up by 12.8%. China also purchased 40% of Chile's exports of unbleached kraft pulp in 1981, rising to second place in Chile's list of top buyers of forest products.

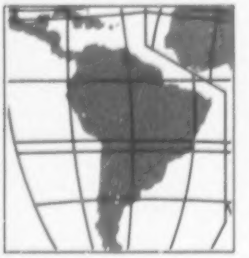
Pulp production in Asia in 1981 was also down from 1980, dropping by 6.8% to 15.2 million metric tons. Imports fell by 26.8% to 6.16 million tons. Once again, the Japanese market effectively determined the overall drop.

Australasia, which effectively means Australia and New Zealand, experienced a drop in pulp production of 2.2% to 1.82 million metric tons. The two countries also pushed pulp exports up slightly and imports fell by a similar amount.

For Australia and New Zealand, 1981 followed a pattern familiar to other areas. A good start faded away as 1981 progressed and the worldwide recession began to make itself felt on exports, particularly on chip exports to the Japanese and Southeast Asian markets.

However, New Zealand's pulp, paper, and board output reached record levels last year, mainly because of strong demand but also helped by lack of labor disputes. Gales flattened an estimated three million cubic meters of timber in New Zealand's North Island earlier this year and this is likely to have an impact on the country's wood reserves for several years.

Australian mills were affected more severely by Asian competition and some strikes. Overall production was down about 5% from 1980.



LATIN AMERICA

PAPER AND PULP output in 1981 fell just below 1980 levels, ending the climb of recent years and marking a period of negligible economic growth, rocketing inflation, and political instability for many Latin American countries.

1981 was also a year in which negotiations began for the sale of one of the most daring pulp mill projects, Jari Florestal in Brazil. It was eventually bought by a consortium of 20 Brazilian companies, none with pulp or paper interests, so ending the 15-year involvement of American entrepreneur Daniel Ludwig.

Other major international projects were either shelved or cancelled, such as the decision by Japanese partners to give up on the Flonibra project, also in Brazil, which was supposed to eventually produce 600,000 tpy of bleached pulp from eucalyptus.

Total paper and board output in 1981 was 7.57 million metric tons, down 2.1%. The cause of the fall was the drop in Brazil's production—by far the largest producer—to 3.3 million tons, 160,000 tons below 1980. The other major producer, Mexico, bettered its 1980 output by 2.9% to 1.95 million tons. Of the other two countries producing more than 500,000 tpy, Argentina was 50,000 tons down on 1980 but Venezuelan mills marginally improved output to 518,000 tons.

Total annual paper/board capacity for Latin American countries is estimated at 9.57 million tons, from some 420 mills.

Latin American paper/board imports in 1981 were 1.82 million metric tons (same as 1980), while exports of 448,000 tons were up 20.8%.

Pulp output in 1981 was 5.79 million metric tons, down 1% from 1980. Brazil, however, maintained pulp production at the 1980 level at 3.5 million tons; and Mexico's output was up slightly at 740,000 tons. Production drops in Argentina and Chile were the main cause of the overall decrease. Chemical pulp output in Latin America in 1981 was down 1.3% at 4.29 million tons.

The continent's pulp trade balance improved by 13% even though both imports (770,000 metric tons) and exports (1.15 million tons) were lower than 1980. Annual pulp capacity in 1981 was 6.76 million tons, produced by about 130 mills.

AFRICA

AFRICAN PAPER AND board production rose in 1981 by 5.6% to 1.81 million metric tons, largely due to increased South African production. Any major change in Africa's output is likely to be caused by South Africa, which produces more than twice as much paper and board as the rest of the continent combined.

In 1981, South Africa recorded an increase in production of just under 90,000 metric tons, with newsprint output rising 80,000 tons and printing/writing grades rising by nearly 30,000 tons. There were small drops in some other grades.

One important addition was the startup of Zambia's first paper mill in mid-1981, which produced 16,000 metric tons. The country's first pulp mill is due to start in 1982, producing 14,000 tpy.

Based on available figures, total paper and board imports to Africa fell by about 2% to just under 900,000 metric tons in 1981, while exports rose by 22.1% to 200,000 tons. The continent's paper and board capacity was estimated to be nearly two million tons, produced by some 69 mills.

Africa's total pulp output in 1981 was 1.65 million metric tons, up 6.7% from 1980. South Africa was again the main producer with 1.12 million tons, an increase of over 100,000 tons.

In Cameroon, Cellulose du Cameroun's new Edea pulp mill produced its full 120,000 metric tpy of bleached kraft pulp for export in 1981. But in March 1982 an explosion destroyed the ClO line. After a four-week closure, the mill restarted producing unbleached pulp. Full repair was expected to take several months.

Africa's pulp capacity is just under two million metric tons, produced by 29 mills. Pulp imports in 1981 were 270,000 tons, down 10.6%; and exports increased by 3.4% to 730,000 tons.

Over the last year there have been announcements of new small mills producing wastepaper-based paper or board. This development is reflected in a 31% increase in wastepaper consumption in 1981, reaching a total of 560,000 metric tons.

Further data on world's paper industry

Detailed data on world production, consumption, and pulp and paper industry economics is available in the 1982 Review Number published by our associate magazine, PULP & PAPER INTERNATIONAL (publication date July 25, 1982). Copies of this issue, which include individual reports for all producing countries, are $20 each.

To order, send payment (US$) to *PPI*, Circulation Dept. 500 Howard St., San Francisco, Calif. 94105.

REVIEW OF TOP 20 PRODUCING NATIONS

Abridged data on production and export/import trade are given for countries included in the Top 20 tables for paper and board production and pulp production (see page 50)

Australia

Population: 14,900,000. Per capita consumption of paper and board: 137 kg/308 lb. Paper and board mills: 17. Pulp mills: 16 (woodpulp, sulfate: 1; sulfite: 1; soda: 1; semichemical: 7; mechanical: 5; nonwood: 1)

Paper/board capacity: 1,730,000 e tons **Pulp capacity:** 875,000 e tons

(000 metric tons)

	Production		Imports		Exports	
	1980	**1981**	**1980**	**1981**	**1980**	**1981**
Paper	1471	1394	747	741	119	90
Board		—	—	—	—	—
Total	**1471**	**1394**	**747**	**747**	**119**	**90**
Chemical woodpulp	490	442	271	252	na	na
Other pulps	223	219	5	2	na	na
Total	**713**	**661**	**276**	**254**	**na**	**na**

Austria

Population: 7,507,666. Per capita consumption of paper and board: 108 kg/238 lb. Paper and board mills: 36. Pulp mills: 22 (woodpulp, sulfate: 2; sulfite: 9; semichemical: 2; mechanical: 11)

Paper/board capacity: 1,911,000 tons **Pulp capacity:** 1,356,000 tons
Operating rate 1981: 87% **Operating rate 1981:** 89%

(000 metric tons)

	Production		Imports		Exports	
	1980	**1981**	**1980**	**1981**	**1980**	**1981**
Paper	903	935	96	111	551	610
Board	713	736	89	95	412	440
Total	**1616**	**1671**	**185**	**206**	**963**	**1050**
Chemical woodpulp	887	861	157	186	245	250
Other pulps	342	349	23	15	9	12
Total	**1229**	**1210**	**180**	**201**	**254**	**262**

Brazil

Population: 122,000,000. Per capita consumption of paper and board: 29 kg/64 lb. Paper and board mills: 160. Pulp mills: 48.

Paper/board capacity: 4,000,000 tons **Pulp capacity:** 3,900,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1980	**1981**	**1980**	**1981**	**1980**	**1981**
Paper	2253	2062	202	234	151	219
Board	1214	1228	0	0	23	78
Total	**3467**	**3290**	**202**	**234**	**174**	**297**
Chemical woodpulp	3082	2910	58	15	772	769
Other pulps	425	na	8	6	3	0
Total	**3507**	**3500e**	**66**	**21**	**775**	**763**

Canada

Population: 24,200,000. Per capita consumption of paper and board: 197 kg/443 lb. Paper and board mills: 112. Pulp mills: 36.

Paper/board capacity: 15,600,000 tons **Pulpcapacity:** 23,100,000tons
Operating rate 1981: 87% **Operating rate 1981:** 86%

(000 metric tons)

	Production		Imports		Exports	
	1980	**1981**	**1980**	**1981**	**1980**	**1981**
Paper	11,045	11,255	194	274	8,625	8,753
Board	2344	2275	87	112	496	400
Total	**13,389**	**13,530**	**281**	**386**	**9121**	**9153**
Chemical woodpulp	12,125	11,370	87	77	6604	6076
Other pulps	7819	7905	53	60	585	515
Total	**19,944**	**19,275**	**140**	**137**	**7189**	**6591**

Chile

Population: 11,390,000. Per capita consumption of paper and board: 25 kg/56 lb. Paper and board mills: 18. Pulp mills: 7 (woodpulp, sulfate: 3; sulfite: 1; mechanical: 3)

Paper/board capacity: 379,100 tons **Pulp capacity:** 813,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1980	**1981**	**1980**	**1981**	**1980**	**1981**
Paper	303	300	48	52	79	55
Board	24	19	7	7	5	na
Total	**327**	**319**	**55**	**59**	**84**	**55**
Chemical woodpulp	633	618	—	—	436	384
Other pulps	131	125	—	—	—	—
Total	**764**	**743**	**—**	**—**	**436**	**384**

China, People's Rep. of

Population: 988,000,000. Per capita consumption of paper and board: 5.5 kg/12 lb. Paper and board mills: 1,600e

Paper/board capacity: 6,300,000 tons **Pulp capacity:** 5,600,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1980	**1981**	**1980**	**1981**	**1980**	**1981**
Paper	3410	3260	135	na	na	na
Board	1940	2140	575	na	na	na
Total	**5350**	**5400**	**710**	**na**	**178**	**192**
Chemical woodpulp	3380	3250	na	na	—	—
Other pulps	1110	1060	na	na	—	—
Total	**4490**	**4310**	**416**	**na**	**—**	**—**

Czechoslovakia

Population: 15,450,000. Per capita consumption of paper and board: 75 kg/165 lb. Paper and board mills: 49. Pulp mills: 24 (woodpulp, sulfate: 5; sulfite: 7; semichemical: 1; mechanical: 10; nonwood: 1)

Paper/board capacity: 1,282,000 tons **Pulp capacity:** 1,031,000 tons
Operating rate 1981: 96% **Operating rate 1981:** 85%

(000 metric tons)

	Production		Imports		Exports	
	1980	**1981**	**1980**	**1981**	**1980**	**1981**
Paper	689	686	49	48	98	111
Board	335	539	82	78	66	80
Total	**1024**	**1225**	**131**	**126**	**164**	**191**
Chemical woodpulp	625	645	87	84	9	9
Other pulps	228	235	27	26	4	4
Total	**853**	**880**	**114**	**110**	**13**	**13**

Finland

Population: 4,800,000. Per capita consumption of paper and board: 198 kg/437 lb. Paper and board mills: 46. Pulp mills: 52 (woodpulp, sulfate: 18; sulfite: 9; semichemical: 3; mechanical: 22)

Paper/board capacity: 7,025,000 tons **Pulp capacity:** 8,510,000 tons

(000 metric tons)

	Production		Imports		Exports	
	1980	**1981**	**1980**	**1981**	**1980**	**1981**
Paper	4493	4618	11	13	3688	3694
Board	1426	1517	29	29	1104	1141
Total	**5919**	**6135**	**40**	**42**	**4792**	**4835**
Chemical woodpulp	4590	4545	5	8	1732	1494
Other pulps	2644	2786	31	28	207	191
Total	**7234**	**7331**	**36**	**36**	**1939**	**1685**

France

Population: 54,000,000. Per capita consumption of paper and board: 115 kg/259 lb. Paper and board mills: 172. Pulp mills: 28 (woodpulp, sulfate: 8; sulfite: 4; semichemical and mechanical: 16)

Paper/board capacity: 5,500,000 tons **Pulp capacity:** 2,000,000 tons

	Production		Imports		Exports	
	(000 metric tons)					
	1980	1981	1980	1981	1980	1981
Paper	3199	3170	1342	1425	811	844
Board	1954	1978	788	749	249	245
Total	**5153**	**5148**	**2130**	**2174**	**1060**	**1089**
Chemical woodpulp	1396	1301	1591	1585	169	149
Other pulps	433	415	61	66	3	4
Total	**1829**	**1716**	**1652**	**1651**	**172**	**153**

Fed. Rep. of Germany

Population: 61,666,000. Per capita consumption of paper and board: 157 kg/353 lb. Paper and board mills: 200. Pulp mills: 37 (woodpulp, sulfite: 11; semichemical: 1; mechanical: 25)

Paper/board capacity: 10,028,000 tons **Pulp capacity:** 2,322,000 tons

	Production		Imports		Exports	
	(000 metric tons)					
	1980	1981	1980	1981	1980	1981
Paper	4758	4938	2592	2608	1117	1296
Board	2822	2857	1179	1124	592	646
Total	**7580**	**7795**	**3771**	**3732**	**1709**	**1942**
Chemical woodpulp	691	642	2237	2238	77	74
Other pulps	1304	1379	209	186	33	37
Total	**1995**	**2021**	**2446**	**2424**	**110**	**111**

Italy

Population: 57,180,422. Per capita consumption of paper and board; 87 kg/192 lb. Paper and board mills: 480. Pulp mills: 55 (sulfite: 2; semichemical: 5; mechanical: 28; nonwood: 20)

Paper/board capacity: 5,850,000 tons **Pulp capacity:** 1,350,000 tons
Operating rate 1981: 83% **Operating rate 1981:** 71%

	Production		Imports		Exports	
	(000 metric tons)					
	1980	1981	1980	1981	1980	1981
Paper	2971	2933	782	792	533	654
Board	1964	1911	211	175	151	167
Total	**4935**	**4844**	**993**	**967**	**684**	**821**
Chemical woodpulp	167	189	1518	1397	8	12
Other pulps	908	773	107	72	1	—
Total	**1075e**	**962**	**1625**	**1469**	**9**	**12**

Japan

Population: 117,890,000. Per capita consumption of paper and board: 143 kg/321 lb. Paper and board mills: 593. Pulp mills: 68 (woodpulp, sulfate: 38; sulfite: 7; soda: 0; semichemical: 13; mechanical: 20; nonwood: 1)

Paper/board capacity: 22,473,000 tons **Pulp capacity:** 12,788,000 tons

	Production		Imports		Exports	
	(000 metric tons)					
	1980	1981	1980	1981	1980	1981
Paper	10,536	9,944	245	250	307	360
Board	7552	7037	248	239	348	314
Total	**18,088**	**16,981**	**493**	**489**	**655**	**674**
Chemical woodpulp	7157	6272	1550	1176	99	103
Other pulps	2631	2,338	667	522	1	1
Total	**9788**	**8610**	**2,217**	**1,698**	**100**	**104**

Korea, Rep. of

Population: 38,723,000. Per capita consumption of paper and board; 42 kg/93 lb. Paper and board mills: 170e. Pulp mills: 5 (sulfate: 1; mechanical: 4)

Paper/board capacity: 2,180,000e tons **Pulp capacity:** 314,000 tons
Operating rate 1981: 82e% **Operating rate 1981:** 71%

	Production		Imports		Exports	
	(000 metric tons)					
	1980	1981	1980	1981	1980	1981
Paper	894	899	10	23	80	105
Board	799	865	13	13	74	76
Total	**1693**	**1764**	**23**	**36**	**154**	**181**
Chemical woodpulp	48	85	404	447	—	—
Other pulps	137	137	64	74	—	—
Total	**185**	**222**	**468**	**521**	—	—

Mexico

Population: 70,000,000. Per capita consumption of paper and board: 36 kg/79 lb. Paper and board mills: 60. Pulp mills: 27 (woodpulp, sulfate: 11; sulfite: 1; mechanical: 1, nonwood: 14)

Paper/board capacity: 2,556,000 tons **Pulp capacity:** 992,500 tons
Operating rate 1981: 76% **Operating rate 1981:** 75%

	Production		Imports		Exports	
	(000 metric tons)					
	1980	1981	1980	1981	1980	1981
Paper	1011	1075	312	461	—	—
Board	884	875	284	150	—	—
Total	**1895**	**1950**	**596**	**611**	—	—
Chemical woodpulp	396	408	164	76	—	—
Other pulps	335	335	44	46	—	—
Total	**731**	**743**	**208**	**122**	—	—

Netherlands

Population: 14,246,000. Per capita consumption of paper and board; 154 kg/340 lb. Paper and board mills: 35. Pulp mills: 5 (mechanical: 4; nonwood: 1)

Paper/board capacity: 1,880,000 tons **Pulp capacity:** 212,000 tons
Operating rate 1981: 91% **Operating rate 1981:** 77%

	Production		Imports		Exports	
	(000 metric tons)					
	1980	1981	1980	1981	1980	1981
Paper	868	820	846	830	473	466
Board	846	863	538	553	424	407
Total	**1714**	**1683**	**1384**	**1383**	**897**	**873**
Chemical woodpulp	—	—	564	515	9	3
Other pulps	206	162	60	45	7	1
Total	**206**	**162**	**624**	**560**	**16**	**14**

New Zealand

Population: 3,195,800. Per capita consumption of paper and board: 135 kg/304 lb. Paper and board mills: 5. Pulp mills: 6 (woodpulp, sulfate: 2; semichemical: 2; mechanical: 5)

Paper/board capacity: 797,632 tons **Pulp capacity:** 1,384,861 tons
Operating rate 1981: 89% **Operating rate 1981:** 84%

	Production		Imports		Exports	
	(000 metric tons)					
	1980	1981	1980	1981	1980	1981
Paper	491	510	39	41	323	315
Board	192	201	—	—	—	—
Total	**683**	**711**	**39**	**41**	**323**	**315**
Chemical woodpulp	569	619	11	6	217	245
Other pulps	578	541	—	—	258	269
Total	**1147**	**1160**	**11**	**6**	**475**	**514**

Norway

Population: 4,093,000. Per capita consumption of paper and board; 141 kg/311 lb. Paper and board mills: 23. Pulp mills: 27 (sulfate: 2; sulfite: 4; semichemical: 2; mechanical: 19)

Paper/board capacity: 1,650,000 tons **Pulp capacity:** 1,945,000 tons
Operating rate 1981: 83% **Operating rate 1981:** 83%

	Production		Imports		Exports	
	(000 metric tons)					
	1980	1981	1980	1981	1980	1981
Paper	1205	1233	98	74	938	924
Board	170	140	69	80	105	91
Total	**1375**	**1373**	**167**	**154**	**1043**	**1015**
Chemical woodpulp	455	563	202	278	63	141
Other pulps	1039	1045	4	5	308	297
Total	**1494**	**1608**	**206**	**283**	**371**	**438**

Portugal

Population: 9,905,000. Per capita consumption of paper and board: 51 kg/112 lb. Paper and board mills: 108. Pulp mills: 8 (sulfate, 5; sulfite, 2; soda, 1)

Paper/board capacity: 650,000 tons **Pulp capacity:** 1,000,000 tons

	Production		Imports		Exports	
	(000 metric tons)					
	1980	1981	1980	1981	1980	1981
Paper	360	388	40	46	16	22
Board	175	181	24	30	131	122
Total	**535**	**569**	**64**	**76**	**147**	**144**
Chemical woodpulp	832	853	24	23	434	455
Other pulps	33	42	6	1	—	—
Total	**865**	**895**	**30**	**24**	**434**	**455**

Romania

Population: 22,000,000. Per capita consumption of paper and board: 32 kg/72 lb. Paper and board mills: 20. Pulp mills: 11 (woodpulp, sulfate: 6; sulfite: 3; semichemical: 1; mechanical: 1; nonwood: 4)

Paper/board capacity: 870,000 tons **Pulp capacity:** 850,000 tons

	Production		Imports		Exports	
	(000 metric tons)					
	1980	1981	1980	1981	1980	1981
Paper	305	305e	na	na	na	na
Board	500*	500e*	na	na	na	na
Total	**805**	**805e**	**46**	**46e**	**167**	**167e**
Chemical woodpulp	645	645e	na	na	na	na
Other pulps	170	170e	na	na	na	na
Total	**815**	**815e**	**60**	**60e**	**26**	**26e**

*Board figures include packaging paper

South Africa

Population: 29,360,000. Per capita consumption of paper and board: 45 kg/101 lb. Paper and board mills: 16. Pulp mills: 10 (woodpulp, sulfate: 2; sulfite: 1; soda: 1; semichemical: 2; mechanical: 2; nonwood: 2)

Paper/board capacity: 1,321,000 tons **Pulp capacity:** 1,193,000 tons

	Production		Imports		Exports	
	(000 metric tons)					
	1980	1981	1980	1981	1980	1981
Paper	634	723	164	174	101	135
Board	566	565	89	80	38	39
Total	**1200**	**1288**	**253**	**254**	**139**	**174**
Chemical woodpulp	432	433	180	207	25	23
Other pulps	580	689	—	1	327	363
Total	**1012**	**1122**	**180**	**208**	**352**	**386**

Spain

Population: 37,500,000. Per capita consumption of paper and board: 70 kg/154 lb. Paper and board mills: 212. Pulp mills: 35 (sulfate, 14; sulfite, 1; semichemical, 1; mechanical, 10; nonwood, 10)

Paper/board capacity: 3,108,000 tons **Pulp capacity:** 1,652,000 tons
Operating rate 1981: 83% **Operating rate 1981:** 84%

	Production		Imports		Exports	
	(000 metric tons)					
	1980	1981	1980	1981	1980	1981
Paper	1415	1422	248	261	147	195
Board	1151	1166	119	90	117	115
Total	**2566**	**2588**	**367**	**351**	**264**	**310**
Chemical woodpulp	1113	1142	262	238	175	175
Other pulps	216	222	10	3	10	8
Total	**1329**	**1364**	**272**	**241**	**185**	**183**

Sweden

Population: 8,330,000. Per capita consumption of paper and board: 200 kg/441 lb. Paper and board mills: 58. Pulp mills: 64 (sulfate, 28, sulfite, 13; semichemical, 2; mechanical, 21)

Paper/board capacity: 6,860,000 tons **Pulp capacity:** 9,625,000 tons
Operating rate 1981: 85.2% **Operating rate 1981:** 80.7%

	Production		Imports		Exports	
	(000 metric tons)					
	1980	1981	1980	1981	1980	1981
Paper	3931	3931	123	124	2849	2918
Board	2258	2220	54	55	1675	1704
Total	**6189**	**6131**	**177**	**179**	**4524**	**4622**
Chemical woodpulp	6617	6531	44	68	2532	2442
Other pulps	2082	1998	1	10	449	380
Total	**8699**	**8529**	**45**	**78**	**2981**	**2822**

Taiwan

Population: 18,100,000. Per capita consumption of paper and board: 78 kg/176 lb. Paper and board mills: 160. Market pulp mills: 3 (sulfate, 1; nonwood, 2)

Paper/board capacity: 1,900,000 tons **Pulp capacity:** 450,000 tons
Operating rate 1981: 79% **Operating rate 1981:** 84%

	Production		Imports		Exports	
	(000 metric tons)					
	1980	1981	1980	1981	1980	1981
Paper	522	532	54	55	36	42
Board	927	966	26	21	111	129
Total	**1449**	**1498**	**80**	**76**	**147**	**171**
Chemical woodpulp	190	257	72	79	39	87
Other pulps	86	93	10	5	15	12
Total	**276**	**350**	**82**	**84**	**54**	**99**

U.S.S.R.

Population: 268,800,000. Per capita consumption of paper and board: 33 kg/73 lb. Paper and board mills: 84. Pulp mills: 56)

Paper/board capacity: 10,000,000 tons **Pulp capacity:** 8,450,000 tons
Operating rate 1981: 90% **Operating rate 1981:** 85%

	Production		Imports		Exports	
	(000 metric tons)					
	1980	1981	1980	1981	1980	1981
Paper	5294	5401	679	730	646	670
Board	3446	3555	214	270	372	380
Total	**8740**	**8956**	**893**	**1000**	**1018**	**1050**
Chemical woodpulp	7100	7160	—	—	823	945
Other pulps	1850	1900	—	—	—	—
Total	**8950**	**9060**	**—**	**—**	**823**	**945**

United Kingdom

Population: 55,950,000. Per capita consumption of paper and board: 124 kg/273 lb. Paper and board mills: 117. Pulp mills: 3 (semichemical, 2; mechanical, 1)

Paper/board capacity: 3,900,000 tons **Pulp capacity:** 180,000 tons
Operating rate 1981: 87% **Operating rate 1981:** 81%

	Production		Imports		Exports	
	(000 metric tons)					
	1980	1981	1980	1981	1980	1981
Paper	2177	1847	2647	—	402	—
Board	1616	1534	863	—	64	—
Total	**3793**	**3381**	**3510**	**—**	**466**	**—**
Chemical woodpulp	122	50	1393	1351	4	—
Other pulps	164	90	195	205	1	—
Total	**286**	**140**	**1588**	**1556**	**5**	**—**

United States

Population: 229,700,000. Per capita consumption of paper and board: 268 kg/591 lb. Paper and board mills: 612. Pulp mills: 248 (woodpulp, sulfate: 126; sulfite: 22; semichemical: 43; mechanical: 96)

Paper/board capacity: 66,007,000 tons **Pulpcapacity:** 52,980,000tons
Operating rate 1981: 91% **Operating rate 1981:** 94%

	Production		Imports		Exports	
	(000 metric tons)					
	1980	1981	1980	1981	1980	1981
Paper	28,631	29,198	7756	7322	852	936
Board	28,205	28,567	91	120	3281	2681
Total	**56,836**	**57,765**	**7847**	**7442**	**4133**	**3617**
Chemical woodpulp	40,333	41,094	3279	3316	2681	2619
Other pulps	5,692	6,065	396	391	771	718
Total	**46,025**	**47,195**	**3675**	**3707**	**3452**	**3337**

B.C. chip exports slowed by industry slump and new technology in Japan

Effects of the slowdown on Fibreco, a major chip exporter with a 900,000-tpy ship-loading facility in Vancouver, B.C., are examined in this article

By GARY E. NASH

☐ In August 1979, Fibreco Export Inc. began operating Canada's largest chip export facility, a C$16-million project located in North Vancouver, B.C. Committed to long-term contracts to supply chips to Japan, this prerecession venture began operations optimistic that the facility could capitalize on the burgeoning Japanese demand for imported chips by specializing in shipments of whitewood chips for TMP. This article reports the progress of Fibreco, which now finds itself caught between uncertain world economics and changing technology.

The B.C. chip export opportunity actually began in the late 1960s when the provincial government began efforts to encourage investors to build pulp mills in the interior of the province. Since there were not enough chips to support pulp expansions at the time, the provincial government had to take steps to ensure adequate supplies of fiber for these proposed expansions.

This prompted changes in government wood harvest and utilization standards. Sawmills were granted increased timber harvests, but in addition to producing lumber, they also have to make chips for pulp mills.

As sawmills became proficient at producing chips along with lumber, the supply of chips outstripped demand, and sawmills were faced with a surplus of chips they could not use. The provincial government was subsequently called upon to find a solution to this problem.

A study was conducted, and the results indicated that export markets should be sought to dispose of the surplus chips. To clear the way for chip shipments, an existing export tax on chips was removed and a policy of granting permits for long-term contracts was established.

With trade restrictions removed, a potentially lucrative export market for B.C.'s whitewood spruce chips to Japan and Europe opened up. In both areas, the paper industry had made heavy commitment in TMP mills. If these mills could obtain a high whitewood spruce content furnish, bleaching requirements would be minimized and they could produce a lightweight newsprint more competitively.

At that time, B.C. was essentially the only supplier able to meet the Japanese and European needs. Some whitewood chips were available from New Zealand, but quantities were limited. Siberia was also a potential source of fiber, but these chips were not available for export, and exports from the U.S. West Coast were primarily made up of redwood and Douglas fir chips.

Since most of B.C.'s chips were produced by a large number of small sawmills scattered throughout the interior of the province—none of which could engage in long-term, noninterruptible contracts—a gathering grid had to be formed to stockpile and market the chips. From this emerged the concept of Fibreco, an export marketing company made up of more than 40 independent smaller companies with each company committing a specified portion of their chip production to export through the parent organization.

Using a mobile shiploader (Rader), an average vessel can be loaded in about 24 hours. Fibreco began loading chips for Japan in Aug. 1979.

Mr. Nash is sales promotion coordinator, Rader Companies Inc., Portland, Ore.

System description

The Fibreco terminal is one of the most modern and efficient chip export terminals in the world. It has storage capacity of 75,000 bone-dry chip units (1 bdu=2400 lb) and an annual handling capacity of ten times that amount. Covering a 23-acre site along Burrard Inlet in North Vancouver, the facility can receive chips by water, rail, and highway carriers.

The bulk of the chips is received from Fibreco's member sawmills by railcar. They are unloaded by a FMC Link-Belt rotary railcar dumper into a deep hopper. From the receiving hopper, chips move via a Rader pneumatic system to a screening station at a transfer tower in the storage area. There the chips are screened, and oversized chips are rechipped. Processed material is belt-conveyed to one of three stations, each of which can store up to 650 tons/hour using a Rader Belt Pile Builder.

At dockside, the chips are loaded into the ship by a Rader mobile shiploader, the largest of its kind in the world. The shiploader is mounted on steel wheels and can travel the length of the dock to reposition after filling a hold. This eliminates having to move the ship during loading and permits a more balanced vessel loading. The shiploader is fully articulated and can raise, lower, and swing its boom to place chips in the hold. Chips are pneumatically loaded at rates to 1200 tons/hour. From a control cab located on the loading boom, the operator has good visibility over the hold and can easily direct the loading head to fill all corners of the hold.

The facility can receive ships with a draught of up to 38 ft (11.5 m). A large vessel can normally be loaded within a 24-hour period. Size of ships vary from 7000- to 13,000-bdu capacity.

A sophisticated mobile shiploader that can load at rates to 1200 tons/hour is used by Fibreco. The operator (in the cab at the end of the loading boom) can maneuver the boom and loading head for maximum load compaction and uniformity.

The first year

Fibreco began operating in 1979 with long-term, noninterruptible contracts to supply Japan with 400,000 bdu of chips annually for the next ten years. At the same time, European buyers were offering to purchase a portion of the remaining chips available in contracts that would amount to C$27 million/year. The Japanese contracts, and the prospects of committing the balance of Fi-

Table 1. **Pulpwood imports to Japan by origin and species, 1965-79**
(1000 m³)

			Southeast Asia/other							
Year	**U.S**	**U.S.S.R.**	**Australia**	**Malaysia**	**New Zealand**	**Indonesia**	**Other**	**Total**	**Grand total**	**% Imports in total pulpwood**
1965										
Softwood	253	142	—	na	—	na	na	22	417	5
Hardwood	—	25	—	na	—	na	na	19	44	—
Total	253	167	—	26	—	9	6	41	461	3
1970										
Softwood	4072	143	—	—	153	—	30	183	4398	37
Hardwood	18	113	—	572	5	25	153	755	886	5
Total	4090	256	—	572	158	25	183	938	5284	19
1975										
Softwood	7103	464	—	—	358	—	—	358	7925	56
Hardwood	430	259	2033	702	31	88	323	3117	3866	26
Total	7533	723	2033	702	389	88	323	3535	11,791	41
1977										
Softwood	8114	588	—	—	388	—	—	388	9090	57
Hardwood	636	302	2830	435	33	59	552	3909	4847	30
Total	8750	890	2830	435	421	59	552	4297	13,937	44
1978										
Softwood	6905	629	—	—	400	—	871	1271	8805	56
Hardwood	352	301	2720	434	56	83	578	3871	4524	29
Total	7257	930	2720	434	456	83	1449	5142	13,329	43
1979										
Softwood	7783	598	—	—	389	—	837	1226	9607	55
Hardwood	624	204	3315	281	114	163	546	4419	5247	32
Total	8407	802	3315	281	503	163	1383	5645	14,854	44

Source: PULP & PAPER INTERNATIONAL, Feb. 1981 breco's annual throughput to other interested buyers, were the backbone of the new export venture.

Japanese commitments were of particular significance since Japan depends heavily on imported wood to support its pulp and paper industry, with about half of all pulpwood used there coming from offshore. By the end of 1979, Japan was already receiving more than 5 million units of pulpwood from exporters—about half in the form of woodchips. Of this imported fiber, 65% was softwood chips, the market segment Fibreco was looking to tap—especially those used for newsprint.

At the time, worldwide newsprint demand had steadily increased from its low point in mid-1975. Japan mirrored this demand, closing 1979 with 80% increased capacity in the newsprint, uncoated printing paper, and coated paper sectors. Mechanical pulp had become the growing mainstay of that capacity. By the end of the decade, almost one-fifth of Japan's pulping capacity was dedicated to mechanical pulp, of which TMP was a major contributor. Three-quarters of a million tons of TMP capacity was on-line—95% of it committed to newsprint.

Fibreco had much to gain from these trends in pulp and papermaking. TMP greatly favors the western Canadian chip supply, which has a high content of western white spruce along with pine and white fir. Mechanical pulp from these species, depending on end-product requirements, requires little or no bleaching and reduced amounts of added chemical pulp to be suitable for a variety of paper grades. This gave Fibreco the leverage it needed to secure long-term contracts.

Besides finding a ready supply of a preferred species, however, Japanese importers had another reason for wanting access to B.C. chips. Nearly 60% of their softwood needs were supplied by imports in 1979, of which 80% came from a single source—the U.S. West Coast. This single source had dominated Japanese imports for a decade, carrying considerable sway over chip prices and availability. A Japanese government advisory board was forecasting growth in production capacity for paper and board to reach 29 million tons by 1990 (more than a 40% increase over the start of the decade), which dictated a broadening of the industry's supply base to lessen the risk of local economies controlling its fiber supply. The wisdom of that strategy was borne out in less than 18 months, when soaring energy costs affecting U.S. chip producers combined with a tight supply were responsible for higher prices for export chips, causing a ripple effect throughout the Japanese pulp and paper community.

Under the terms of Fibreco's contract with five Japanese importers, 300,000 bdu were to be shipped the first year, 1980, and 400,000 bdu were to be shipped annually for the remainder of the contract period. The first year's shipments went according to forecasts. However, by the fourth quarter of that year Fibreco began to receive signals of a slackening demand for its chips. Japan was beginning to feel the effects of what was later to be viewed as that country's worst national depression since the end of the war. Paper production was running at more than 20% over demand, and the industry was forced to adjust inventories, cut production, and reevaluate strategies.

By the end of its second year of operation, expected shipments from Fibreco fell short. And by mid-1982 they had dropped to 60% of those forecasted.

The future

Over the short term, Fibreco's prospects remain uncertain. Anticipated shipments are down, and how soon they will pick up can only be forecast with the broadest of hedges. Despite this uncertainty, Fibreco's CEO, Hugh Cooper, remains optimistic.

"Over the long term," says Cooper, "natural growth in the market will mean that the contracted amounts will still be needed. It's just a matter of time."

At the same time, Cooper is investigating other markets for B.C. chips. Trial shipments to Sweden and France have been made. Other potential markets include central South America, South Korea, and Taiwan.

Meanwhile, new developments will continue to increase competition for chip buyers. Japanese papermakers, for example, plan to use more deinked pulp, which will reduce virgin fiber requirements to some extent. They have also made improvements in the area of groundwood pulping (see PULP & PAPER, August 1981, page 128), which give greater flexibility in fiber usage. Canada, the U.S., and Europe are making similar progress in the area of improved fiber utilization. Joint pulp and paper ventures away from Japan provide another means of limiting dependence on outside chip and/or pulp suppliers to support domestic production. □

Fibreco's storage yard, located on Burrard Inlet in North Vancouver, will hold 75,000 bdu. Chips are received from more than 40 member companies throughout B.C.

Table 2. **Worldwide TMP installations, 1978-1981**

	Canada	**U.S.**	**Sweden**	**Finland**	**Japan**	**Other**	**Total**	**Production increase** (a.d. metric tpd)	**Total production** (a.d. metric tpd)
1978	17	26	13	6	9	30	101	5060	21,000
1979	25	28	14	10	11	36	124	7547	28,608
1980	50	58	24	22	21	71	246	2980	31,587
1981	56	60	26	22	22	75	261	5496	37,083

Source: Ray Leask, The Ontario Paper Co. Ltd.

North American pulp and paper export prospects still bright

Fiber, capital constraints slow world-capacity growth, leaving low-cost U.S. producers in strong position to supply export markets for pulp and linerboard

PULP & PAPER STAFF REPORT

☐ Although export markets have been hard-hit by the strong U.S. dollar and world recession, longer-run prospects for North American pulp and paper exports overseas remain bright, industry speakers told a Forest Products Seminar sponsored by the Financial Analysts Federation and held June 15 and 16 in Portland, Ore.

Limited world capacity growth (due to wood and capital constraints) should cause many regions of the world to turn increasingly to low-cost North American producers for such commodities as linerboard and market pulp, although growth of white paper and newsprint exports may be slower, due to excess capacity overseas.

According to **Thomas P. Clephane**, of Morgan Stanley & Co., who chaired the export panel, overall U.S. pulp and paper shipments overseas should grow at around 6% average annual rate over the next decade—roughly twice that of domestic demand.

Pulp market seen nearing bottom

The pulp market is near the bottom of the trough and

Table 1. **World chemical paper-grade market pulp capacity, potential production and demand**
(000 metric tons)

	1980		1981		1982	1983	1984
Capacity	**Capacity**	**Production**	**Capacity**	**Production**	**Capacity**	**Capacity**	**Capacity**
Canada[1]	6690	6605	6810	6080	6810	6960	7080
U.S.[1]	4655	4455	4900	4400	4940	5020	5115
Nordic countries[1]	5985	5040	6130	4985	5965	5790	5800
N. America/Nordic total	**17,330**	**16,100**	**17,840**	**15,464**	**17,715**	**17,770**	**17,995**
Western Europe[1]	2560	2405	2565	n.a.	2715	2770	n.a.
Latin America[1]	2025	1880	1930	n.a.	1935	2055	n.a.
Japan[1]	1070	910	1070	n.a.	1070	1070	n.a.
Others[1]	955	870	1140	n.a.	1245	1195	n.a.
Total	**23,940**	**22,165**	**24,545**		**24,680**	**24,860**	
Potential production total	**22,264**		**22,830**		**23,602**	**23,101**	
Demand	**Actual**		**Actual**		**Estimated**	**Estimated**	
Canada	735		750		700	750	
U.S.	4430		4325		4260	4500	
Nordic countries	1025		930		875	875	
Western Europe	9135		9010		9060	9400	
Eastern Europe	470		380		350	345	
Latin America	1190		865		875	950	
Japan	2335		1800		1825	2050	
Oceania	335		315		325	340	
Asia/Africa	1775		2095		2025	2275	
Total	**21,430**		**20,470**		**20,295**	**21,485**	
Ratio							
Demand/potential production	**96%**		**90%**		**86%**	**93%**	

[1] Potential production = 95% of capacity for Canada, U.S. and Nordic; 90% for Western Europe and Japan; 85% for Latin America and others
n.a. = not available
Source: American Paper Institute

will shortly see a turnaround with low world-capacity growth contributing to a tightening market over the next several years, particularly for bleached northern softwood kraft, said **Fred G. Robertson**, president of Mead Pulp Sales Inc.

Although North American and Scandinavian producer inventories reached 1.8 million metric tons at the end of April, this is not substantially above the generally accepted "normal" level of 1.3 to 1.5 million tons, and is considerably below the all-time high of 2.9 million tons reached in February 1977, while inventories in the hands of pulp consumers are low, he pointed out.

Table 2. **Estimated average costs of producing bleached kraft paper-grade market pulp**
(U.S.$/a.d. metric ton)

Softwood	**First half 1982**	**First half 1981**
Western Canada	(.8008 C$/U.S.$)	(.8375 C$/U.S.$)
Fiber	$138	$138
Chemicals	37	32
Wages and salaries	55	49
Energy	38	—
Other direct	37	70*
Total direct	305	289
Interest	24	25
Depreciation	16	16
Other indirect	12	12
Total	**357**	**357**
Sweden	(5.90 Skr/U.S.$)	(5.54 Skr/U.S.$)
Fiber	212	189
Wages and salaries	85	78
Energy and chemicals	85	87
Total direct	382	354
Capital and misc.	101	99
Total	**483**	**453**
U.S. South		
Fiber	116	108
Chemicals	45	43
Wages and salaries	58	54
Energy	41	46
Other direct	47	43
Total direct	307	294
Interest	20	20
Depreciation	18	18
Other indirect	17	17
Total	**362**	**349**
Hardwood		
Brazil	(160.686cruz/U.S.$)	(93.96cruz/U.S.$)
Fiber	60	43
Labor	29	32
Energy	25	22
Chemicals	36	25
Total direct	150	122
Supplies, capital, misc.	177	191
Total	**327**	**313**
U.S. South		
Fiber	101	96
Chemicals	32	30
Wages and salaries	58	55
Energy	51	64
Other direct	46	42
Total direct	288	287
Interest	20	20
Depreciation	18	18
Other indirect	17	17
Total	**343**	**342**

*Includes energy
Source: Mead Corp. estimates

"When the large, integrated U.S. paper manufacturers are running full, using all their own pulp and buying more in the marketplace, the world market pulp supply/demand equation tightens up in a hurry," Robertson said. "Following the rundown of inventories in 1977-78, the North American and Nordic mills ran at an average of better than 96% of potential production for the next three years. Prices were increased for seven consecutive quarters beginning with the fourth quarter of 1978 and continuing through the second quarter of 1980 for an aggregate of $200/ton, or more than 60%."

World chemical paper-grade pulp capacity has been estimated at 24.68 metric million tons by a joint committee of North American and Nordic paper associations. By 1983, capacity is only expected to be 1.3% higher than it was in 1981, Robertson noted.

In the major producing areas of North America and Scandinavia, representing about 72% of total world capacity, a 0.5% decline is expected over the same 1981-83 period, while through 1984 the increase will amount to less than 1.0%.

"These nominal growth rates are not surprising in view of the virtual nonavailability of long-term capital at affordable rates," Robertson said. And because of the need for companies to improve liquidity and difficulty in justifying new investment at current pulp price levels, Robertson finds it "difficult to believe that construction of many new market pulp mills will begin during the next three or four years."

Canadian market-pulp capacity is expected to grow by only 4%, or 270,000 tons, between 1981-84, with future wood availability posing a major problem to further expansion, he noted (see Table 1). U.S. market-pulp capacity is expected to grow by 4% over the three-year period, reaching 5.1 million tons in 1984. While the wood supply is not yet a problem in the South, recent expansion has emphasized integrated pulp/paper operations.

In the Nordic countries, capacity is expected to decline by 5% from 6.1 million tons in 1981 to 5.8 million tons in 1984 due to fiber constraints and emphasis on producing higher value paper grades.

Although the Russians have recently been exporting aggressively to raise hard currency, shipments to Western Europe are not expected to increase much above their 1980 level of 185,000 tons, according to Robertson. Offsetting this is 210,000 tons imported from the three Nordic countries, not to mention substantial paper and board shipments from Finland.

Brazil has become a significant factor in the bleached hardwood pulp market, with 1981 exports of 756,000 tons accounting for 22% of the 3.4 million tons exported by all major hardwood producers in the world—the largest share of any country. Acceptance of eucalyptus fiber is shown by the fact that total production of this grade in Brazil, Spain, Portugal and Morocco grew from 12% of North American and Scandinavian hardwood pulp output to more than 60% in 1980 and 1981, the Mead executive noted. However, observers doubt that there will be much new market-pulp capacity added in Brazil until the end of the 1980s.

North America still has cost edge

The North American and Scandinavian industry will operate at an average of 82% of capacity and 88% of potential production this year followed by 86% of capacity and 93% of potential production in 1983, the joint international committee has estimated (see Table 1). Some forecasters have estimated that the world market pulp industry will be operating at practical maximum capacity by 1984, Robertson noted.

Bleached northern softwood kraft supply will be in particularly tight supply, and one prominent forecasting firm has estimated that by 1987 the price could reach $960/ton, almost double current levels.

"Canada and the U.S. South are the most cost-effective regions for softwood pulp production, while Brazil is the leader in hardwood production with excellent quality and competitive costs," according to Robertson.

He estimated average production costs of producing bleached softwood kraft in the first half of 1982 at $357/metric ton in western Canada, $362 in the U.S. South, $420 in Chile, $462 in Finland, and $483 in Sweden. Bleached hardwood kraft production costs range from $327 in Brazil and $329 in Portugal, to $343 in the U.S. South and $385 in Finland, to $521 in Japan (detailed breakdowns for some countries are in Table 2).

These are average costs for existing mills, based on a wide range for interest, depreciation, and other indirect costs. In the U.S. and Canada the difference between higher-cost new facilities and fully depreciated older mills, which cost less to build, can range up to up to $100/ton, depending on the particular mill, Robertson said.

Slower linerboard growth seen in 1980s

World growth in demand for linerboard for all uses will decline in the 1980s to a 3% average annual rate vs 4% in the 1970s, according to **Carl W. Geist Jr.**, vice president containerboard, Weyerhaeuser Co.

Most of this decline is due to an expected reduction in rates of growth for real GNP, with Japan averaging about 5%, the U.S. 2.5%, and Western Europe about 2% in the 1980s, he said.

Some "structural" changes that will reduce the ratio of growth in linerboard demand to that of GNP include the expansion of services as a percentage of total economic activity in the U.S., Europe, and Japan, and a shift in manufacturing to heavier capital goods in countries such as Korea.

There will be some shifting in importance of various regional markets, with the U.S. share of total liner demand declining from 50% in 1980 to 49% in 1990 and Western Europe's declining from 25% to 22%. Pacific Rim and Japan's demand, however, will rise from 18% in 1980 to 20% in 1990—providing a market nearly equal in size to that of Western Europe by the end of the decade, Geist said.

The U.S. is not only the major user of kraft linerboard, but also the major supplier, accounting for about 75% of total world capacity—down from 80% in 1960 and 1970—but its percentage share will probably rise in the future.

Much of the capacity growth in the early 1970s took place outside the U.S. in response to the strong economic growth of the 1960s, but proved excessive after the oil-price increase of 1974 and subsequent reductions in world economic growth, according to Geist.

This capacity overhang has contributed to the current depressed state of the world linerboard market. But in some cases, this is being corrected by outright business failure (Labrador Linerboard in Canada and Vita Mayer in Italy). Excessive expansion in Japan has led to severely depressed industry conditions and a government-coordinated freeze on capacity with an actual permanent 15% decrease in total in-place linerboard capacity.

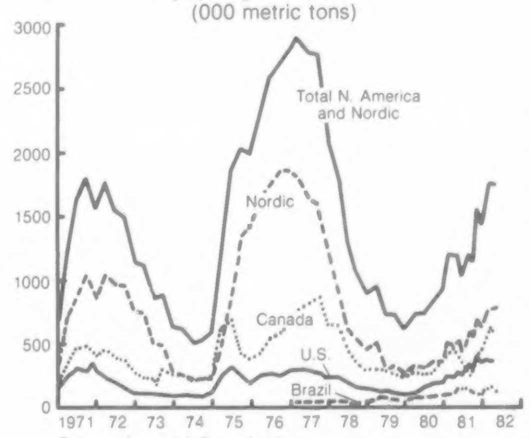
"Such changes clearly will be of benefit as more realistic appraisal of market potential and a greater awareness of constraints produces financially more responsible planning in this segment of the industry," Geist said.

"Linerboard demand grew rapidly at a time when softwood lumber consumption in the U.S., Japan, and Western Europe was also growing rapidly," Geist said. "Thus, a major softwood-chip-consuming product boomed at a time when sawmills were producing increasingly large volumes of chips—and these surplus chips were plentiful, cheap, and looking for a big home. Linerboard gave it to them."

In Sweden, for example, kraft linerboard capacity increases between 1965-75 were large, with residual consumption rising from 3.8 to 8.8 million m³ log equivalent in eight years. But total pulpwood harvest, which rose from 21.8 million m³ in 1972 to 27.2 million m³ in 1974, could not be sustained, while roundwood and residuals rose sharply in price.

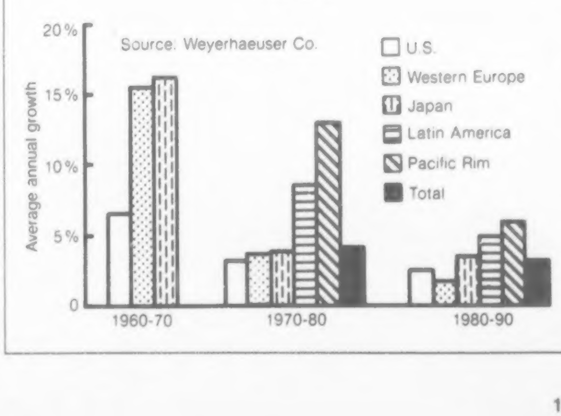
Lumber production during the 1980s is likely to be

Figure 1. **Producers' market inventories of chemical paper-grade pulps**
(000 metric tons)



Source: American Paper Institute

Figure 2. **Linerboard demand growth in selected markets**



Source: Weyerhaeuser Co.

lower in Western Europe, Japan, and the U.S., making increased use of roundwood necessary and placing constraints on further expansion. "In addition, capital productivity and economies of scale aren't providing the same boost that they did in the past," Geist said.

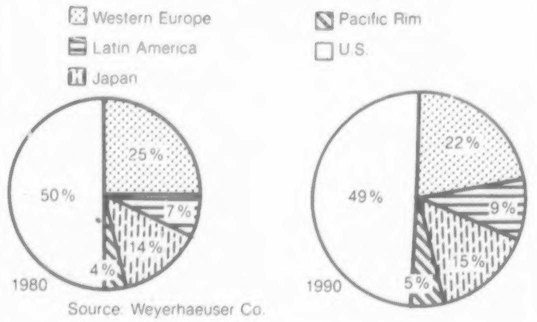
Linerboard consumption in Western Europe will grow from slightly under 7 million short tons in 1980 to a little over 8 million tons in 1990. Wastepaper-based liner will grow to about 55% of the market. European and Scandinavian capacity for kraft liner may grow a very little (almost an efficiency creep level) and there will be an increased need for imports from the U.S.

"Western Europe should continue to be our single largest market for kraft linerboard outside the U.S., despite tariff problems vis-à-vis the EFTA countries, exchange rate volatility and currency weakness, increasing transportation costs, and Scandinavian vertical integration into the EEC," Geist said.

Prospects will vary significantly by country, with strong currency areas such as West Germany providing good opportunities. Agricultural regions such as Italy, southern France, Spain, and Greece will also provide market growth due to several factors, including Scandinavian transport costs to the Mediterranean region. "But Europe, as a whole, will continue to be a very competitive market," the Weyco executive said.

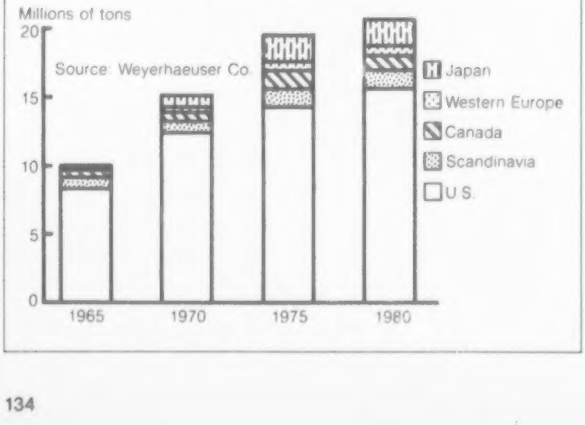
Japanese linerboard demand will grow from about 4 million tons in 1980 to about 5.5 million tons in 1990. "There has been little plastic substitution in Japan, and we don't expect to see much more substitution due to end uses of corrugated and the price of plastic feedstocks in Japan," Geist said.

Figure 3. **Changing regional share of linerboard demand for selected markets**



Source: Weyerhaeuser Co.

Figure 4. **Kraft linerboard capacity growth in major producing countries**



Source: Weyerhaeuser Co.

More waste will be used in linerboard production in Japan, but availability and prices will be a constraint. The magnitude of that constraint will depend heavily on the yen/dollar exchange rate. "We see a reasonable range of imports of from 500,000 to 800,000 tons by 1990—given a 'reasonable' purchasing parity value for the yen in that time period."

Although hard to predict, future demand from the People's Republic of China should provide a growing market for U.S. producers, Geist said. Japan will play less of a role as an exporter to the Chinese market, wood resources in China are limited, and capital is not available for infrastructure and production facilities. At the same time, China's linerboard requirements should grow as the country increases export of light manufactured goods to earn needed foreign exchange.

First significant U.S. linerboard exports to the PRC took place in 1980 when U.S. producers shipped 319,000 tons followed by another 174,000 tons in 1981. Only a small quantity of linerboard was shipped to China in the first quarter of 1982, but the Chinese have recently renewed some purchasing, and U.S. shipments this year could total more than 100,000 tons, Geist said later in response to a question.

Limited export growth seen in white papers

Market pulp, linerboard, newsprint and wastepaper will continue to be the dominant U.S. export grades in the 1980s, with bleached board also increasing in importance, according to **J. W. Garrigan**, chairman of Price & Pierce International Inc.

While there has also been speculation about the U.S. becoming a major supplier of commodity grades to Europe, and some small quantities have been exported, no evidence of a definite trend exists, he said.

"Basically for the next few years, Europe has enough papermaking capacity to satisfy its own needs. Further, if the EEC needs to import more paper, then the Scandinavians, because of their freight and tariff advantages, are the logical suppliers."

If enough older, less-efficient capacity is phased out in Europe over the longer run, the U.S. may become a more important supplier to Western Europe because of its low wood and manufacturing costs. But while more U.S. paper may be shipped to Europe during the late 1980s, growth will be modest because of higher profitability in the U.S. home market and protectionist moves by the European industry.

Garrigan was also cautious about newsprint export growth, which would provide a much needed safety valve for excess North American capacity.

Worldwide, several million tons of new capacity will be brought on stream between 1980-84, an amount that will exceed demand by a considerable margin, making "some indigestion inevitable."

The large U.S. market will absorb the output from the new U.S. newsprint machines, but some Canadian tonnage will be displaced, forcing Canadian mills to try to place more tonnage in offshore markets. "Exactly where is difficult to pinpoint at the moment," Garrigan said. "Consequently, the outlook for the Canadian industry is not bright, particularly for the next two to three years."

However, the long-run outlook for wastepaper exports from the U.S. is bright, according to Garrigan. From 1970 to 1980, wastepaper exports grew at an average annual rate of 21% and hit 2.4 million metric tons in 1980. Because of the worldwide recession, exports fell in 1981 and will probably fall more this year.

"When the world economy revives again forecast supplies of market pulp would seem to be insufficient to satifsy demand," he said. "As a result, the need for wastepaper should strengthen significantly."

But overall growth in U.S. paper industry exports to the Far East may not be as rapid as many expect, Garrigan said.

Although China is trying hard to modernize, "progress is proving to be much slower than was originally contemplated, and many projects have been scaled back or postponed indefinitely." And he noted that the export program for which China made its large containerboard purchases "may not have been nearly as successful as was planned."

While the Japanese may import more linerboard and newsprint in the 1980s because of high domestic production costs, growth in U.S. exports may be slower than many expect due to "the Japanese business system and nationalistic feelings."

Chip export market should remain stable

The sometimes volatile chip export market should remain fairly stable through the remainder of this year, according to **Lee C. Simpson**, vice president for operations, Louisiana-Pacific Corp.

"Lumber and plywood production on the West Coast is operating at 66% and 59% of capacity, respectively, and will probably continue at these rates through 1982." However, he noted that "pulp and paper manufacturers will probably take more downtime this year for inventory reduction than has been taken for the last ten years." And Japan, by far the largest buyer of West Coast chips, has contracted to buy fewer chips in 1982 than last year.

As a result, export contract chip prices, which were stable the first and second quarters (at around $101 to $103/bdu), will probably stay that way through the third and fourth quarters. But, spot prices on export chips, have been moving at a 30% discount to contract prices.

Export chip inventories have remained stable over the last four months at around 310,000 units, compared to a more normal level of 500,000 units. There has been some dislocation, however, with some inventory rise in Vancouver, B.C., and some decline at Coos Bay, Ore.

Simpson sees a fairly typical economic recovery, with housing improving in the second quarter of 1983 before much pickup in pulp and paper operations. As a result, chip inventories should begin to increase by the second quarter of 1983 or earlier, and prices may weaken.

Chips, shavings, and hog fuel have become an important part of the profitability of Northwest sawmills and plywood plants, the L-P executive noted. This importance has increased in the recent downturn, with operators chipping low-grade wood, enabling them to reduce the loss on their lumber output and generating an immediate sale. Revenue from these products often constitutes 5% to 8% of the total sales of the mill. ☐

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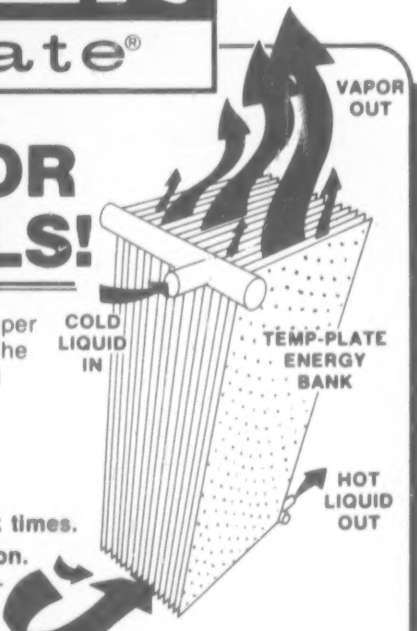

Chlorate production steady, U.S. imports increasing

By BARRY SHOCKETT

U.S. sodium chlorate ($NaClO_3$) production has been flat since 1979 due to a slow economy and increased imports from Canada. Lower power costs in Canada (for example, Que.), where abundant hydropower has placed U.S. producers at a disadvantage, was one reason IMC closed its facility in Orrington, Maine.

Canadian producers face better prospects due to stronger export markets, although domestic demand is slow. Exports have grown from 14% of production in 1979 to an estimated 28% in 1982.

U.S. statistics, sodium chlorate (000 short tons)

	1979	1980	1981	1982e
Nameplate capacity	408	388	388	400
Production	268.6	278.4	280.5	280
Shipments	255.1	266.1	270	270
Imports	36.6	56.7	75.5	84
Exports	4.1	1.3	0.6	0.5
Apparent consumption	287.5	321.5	345	353.5
Pulp bleaching	236	263.5	283	290
Miscellaneous*	51.5	58	62	63.5

*Includes other chlorates, uranium, agriculture, and others
Source: Bureau of Census, U.S. Dept. of Commerce

Canadian statistics, sodium chlorate (000 short tons)

	1979	1980	1981	1982e
Nameplate capacity	270	314	346	404
Production	247	269.5	281	298
Imports	2.6	1.2	1.4	1.1
Exports	36.6	56.7	75.5	84
Domestic demand	206.5	219	207	215
Pulp bleaching	199	209.5	197	203
Other*	7.5	9.5	10	12

*Including uranium, agchems, and others

SODIUM CHLORATE

UNITED STATES

Uses: Pulp mills use most of the sodium chlorate for on-site generation of chlorine dioxide. Others uses are: chemical intermediate, uranium production, and agriculture.

Demand: Since 1979, ClO_2 generation has consumed about 82% of total ($NaClO_3$) demand. In 1981, pulp mills used an estimated 283,000 tons out of a total of 345,000 tons and this will increase to about 290,000 tons in 1982. 75,000 tons were imported in 1981, and this should increase to 84,000 in 1982.

Sources: The major chlorate producers include Erco Industries, Georgia-Pacific, Kerr-McGee, Occidental Chemical's Hooker Div., Olin, and Penwalt. Smaller facilities are operated by Brunswick Chemical, Huron Chemicals, and Pacific Engineering. In addition, imports from Canada are playing an increasing role in the U.S. market place.

Availability: Imports and increasing domestic capacity will keep an adequate supply in the foreseeable future. 1981, market; 1980, market; 1979, market.

Pricing: On Jan. 1, 1982, there were two list prices in effect: $420/ton and $440/ton, f.o.b. works. However, in the first six months the actual transaction price was down to around $375/ton, which had been the list price in early 1981 in the Northeast. Most producers eliminated the $45/ton discounting off the $420/ton list on July 1, 1982. Producers quoting the $440/ton list are reportedly matching the lower price. Prices should remain unchanged this year, but the $420/ton price could increase 8%-10% in 1983 to pass on increased power costs. History: 1981, $375/ton; 1980, $345-375/ton; 1979, $335-$345/ton.

Forecast: Additional capacity to be installed by mid-1983 may partially offset growing imports from Canada, but Canadian capacity should be nudging the 500,000-tpy mark by mid-decade. Postponement of the effective date for effluent regulations may somewhat retard growth in chlorine dioxide use.

CANADA

Uses: Most ($NaClO_3$) produced, either captively or for merchant sales, is employed by kraft pulp mills for on-site generation of chlorine dioxide used in pulp bleaching. Others include: uranium processing and agchems.

Demand: Pulp mills used an estimated 197,000 tons in 1981 (95% of the total), a 6% decrease from 1980 due to strikes on the West Coast and weak market-pulp demand. This should increase to about 203,000 tons in 1982, but weak pulp markets will keep slowing growth.

Sources: Major merchant producers are: Canadian Occidental, Erco Industries, Kema Nobel (formerly QueNord Chemicals), and PPG Industries' Stanchem Div. BCM Technologies will bring its first plant online by 1983 with production dedicated to export markets. Four small captive plants have closed since 1979 (most recently Canso Chemicals) leaving BC Chemicals, St. Anne Chemical, and Saskatoon Chemical as captive producers.

Pricing: Prices increased from $410/ton to $420/ton, f.o.b., works in early 1982, up from the 1981 price of $365/ton, and should stay unchanged through the rest of the year. History: 1980, $310-$330/ton; 1979, $281-$310/ton.

Availability: $NaClO_3$ supplies will be adequate with 57,000 tons of capacity starting up in 1982 and 58,000 additional tons in 1983. 1981, market; 1980, market; 1979, market.

Forecast: Demand growth for $NaClO_3$ has slowed, but a number of new ClO_2 generators are planned and demand should grow 6%/year when these markets revive.

Mr. Shockett is consulting editor-chemical markets for PULP & PAPER.

PULP & PAPER

September 1982

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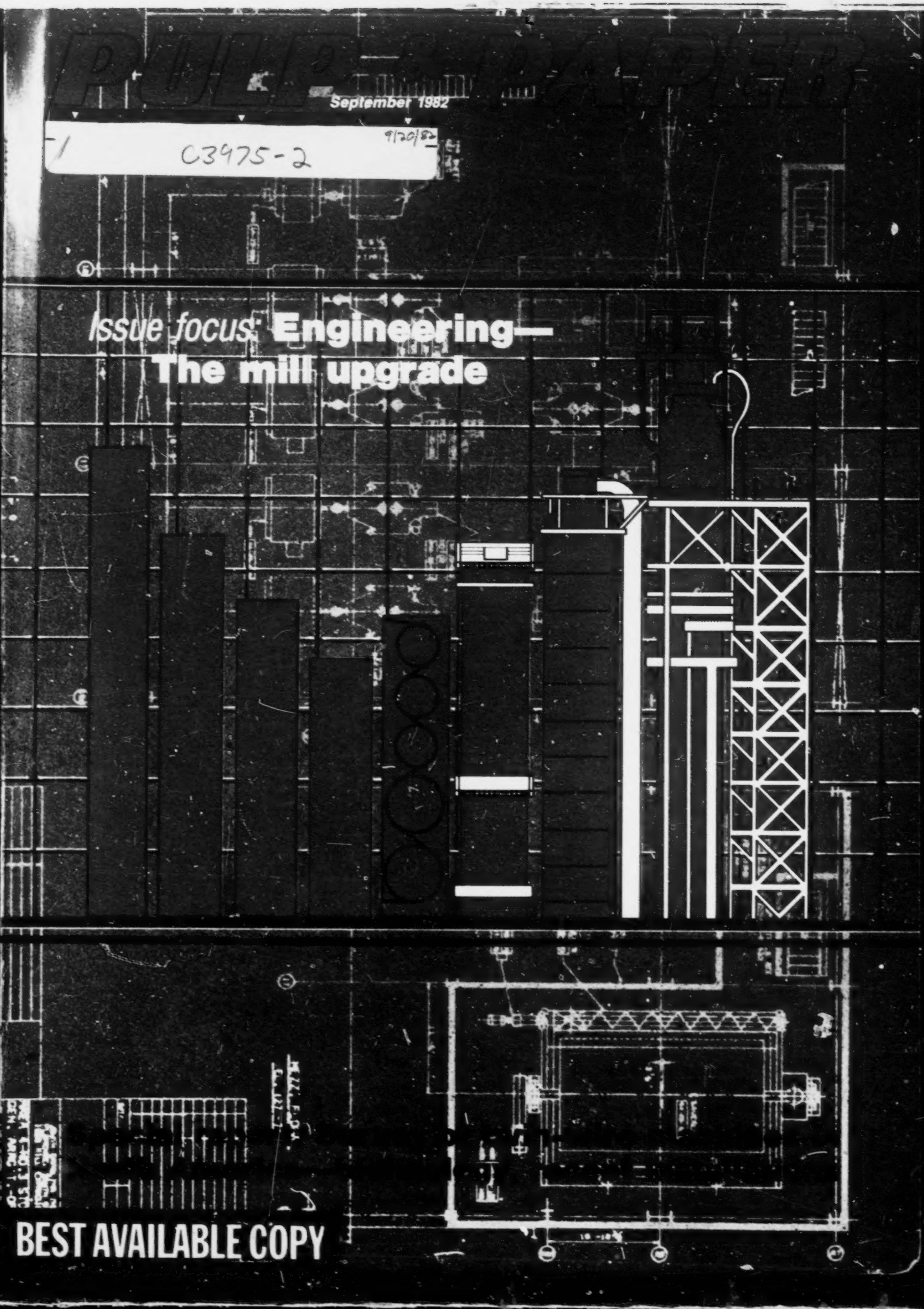
Issue focus: Engineering— The mill upgrade



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PULP&PAPER

Volume 57 Number 9 September 1982

ISSUE FOCUS: Engineering

HIGHLIGHT: THE MILL UPGRADE

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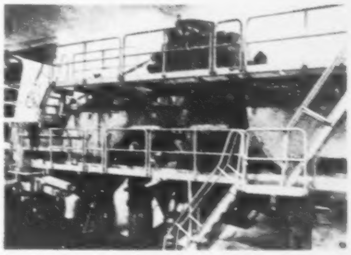
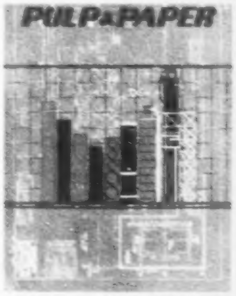


Kruger's twin-wire 150



COVER: *The push for higher production efficiency, profits has increased the pace of paper industry modernization in recent years. This issue examines the mill upgrade from three critical viewpoints—engineering design, construction, and labor/staffing. (Cover art by Rik Olson)*

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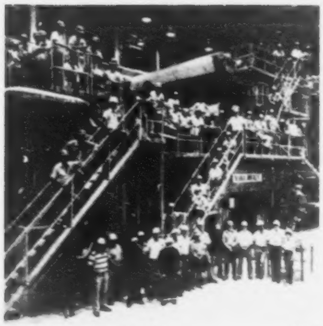
ABP BPA



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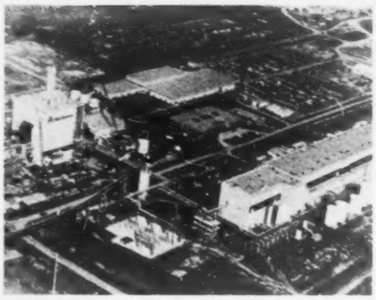

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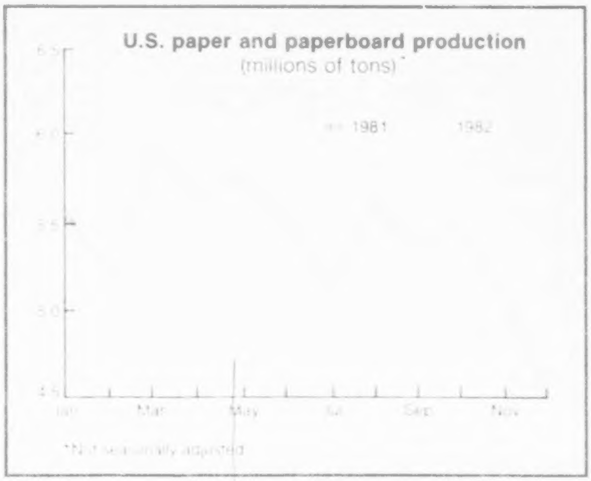
MONTH IN STATISTICS

U.S. paper and paperboard production in June totaled 4.9 million short tons, 7.3% below June 1981 levels, according to the American Paper Institute. Adjusted for seasonal and work-day factors, the June production rate came to 59.4 million tpy, bringing the second-quarter average to 57.8 million tpy, down from the first-quarter average of 61.0 million tpy.

Among major grades, newsprint continued to exceed its year-ago level for the first six months of the year, while coated paper showed the strongest trend among printing paper grades, with six-month shipments nearly matching year ago. In contrast, packaging and industrial paper grades were down sharply for the six-month period, down 9% from 1981 levels. Declines in paperboard production were fairly well distributed throughout the grade structure, with the largest decline for the first half in semichemical medium, down 9%.

Total Canadian newsprint shipments in June came to 418,000 metric tons, down 18.8% from June 1981, according to the Canadian Pulp & Paper Assn. Newsprint mill operating rates slipped to 79% in June from 88% in May, and were well below the 96% rate of a year earlier.


U.S. paper and paperboard production
(millions of tons)*

*Not seasonally adjusted

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	June	423	−4.9	5,240	2.0
Uncoated groundwood (s)	June	114	5.8	1,398	−6.2
Coated paper (s)	June	415	1.2	4,922	−0.5
Uncoated free sheet (s)	June	609	−8.6	7,803	−4.2
Unbleached kraft packaging and industrial (s)	June	292	−7.6	3,656	−9.3
Tissue	June	355	6.1	4,395	3.1
Total paper	**June**	**2,147**	**−6.0**	**30,423**	**−3.5**
Kraft linerboard, unbleached	June	1,127	−8.1	13,927	−7.9
Semichemical medium	June	376	−3.1	4,489	9.0
Bleached paperboard	June	310	6.3	3,801	−6.5
Recycled paperboard	June	540	11.2	6,773	−7.8
Total paperboard	**June**	**2,430**	**−8.4**	**30,073**	**−7.8**
Total paper and paperboard*	**June**	**4,876**	**−7.3**	**60,495**	**−5.7**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	May	4,266	−7.3	51,205	−4.3
Market pulp production	May	480	10.6	5,934	−4.7
Wastepaper consumption at paper/board mills	May	1,195	−7.2	13,935	−3.6
Pulpwood consumption (cords)	June	6,300	−6.2	79,234	−2.0
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	June	20.071	5.1	117.590†	6.3
Containerboard inventories at box plants	June 1	2,663	15.8		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	May	746	0.9	8,027	−6.7
Imports of Canadian newsprint	May	618	-	6,782†	5.2
U.S. paper exports (including products)	May	380	−15.2	4,232	−16.1
Exports of unbleached kraft linerboard	June	167	4.4	1,951	−4.3
Exports of woodpulp	May	326	−10.2	3,565	−5.9
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	June	418	−18.8	2,885†	−6.0
Operating rates	June	79%	96%	89%	97%
Inventories held by U.S. consumers	June 30	1,564	12.1		
Woodpulp shipments (export only)	June	507	−25.7	2,978†	−18.7
Operating rates	June	83%	96%	83%	92%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn.
*Includes construction and wet machine grades. †Not annualized. ‡Not directly comparable to year ago because of coding change. (s) = shipments

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FINANCE

U.S. paper profits fall in second quarter

Continued depressed market conditions in North America and abroad caused U.S. pulp and paper industry second-quarter profits to drop sharply from a year ago, with at least four major companies reporting losses for the period. Paper profits fell 41% on a 10% drop in sales, according to reports from 28 firms.

The earnings decline reflected lower shipments along with a serious profit margin squeeze caused by substantial price erosion—with such grades as containerboard, market pulp and much uncoated white paper selling below year-ago levels.

For seven more firms with extensive forest products holdings, the second quarter was even bleaker: earnings fell 54% and sales were off 8%, as high interest rates continued to curtail housing starts and wood products operations generally ran in the red. Earnings for the total U.S. paper/forest products industry dropped 45%, while sales were 9% below 1981.

IP profits tumble. "The poor performance of the U.S. economy, weak export markets, and continuing high interest rates combined to depress demand and prices for lumber, plywood and paper products," said Edwin A. Gee, International Paper Co. chairman and CEO. IP reported earnings down 51%—to $41.2 million on sales of $1.03 billion—a decline of 26% from year-earlier levels.

Crown Zellerbach posted a 43% profit decline on an 8% falloff in sales, with a sharp improvement in earnings from domestic operations offset by substantial losses from the company's Canadian subsidiary. Great Northern Nekoosa Corp.'s earnings fell 29% on a 7% drop in sales, due to an almost 13% decline in shipments of paper, containerboard and pulp coupled with "widespread" price weakness. Mead Corp. posted a $1-million loss for the quarter vs profits of $36 million in second-quarter 1981, and a 7% decline in sales.

Wood products still down. A slight seasonal pickup in second-quarter demand was not enough to pull wood products operations out of the red for most major forest products companies, while income from their pulp and paper operations continued to erode. Boise Cascade Corp. reported an $8-million loss in the quarter vs profits of $27 million a year ago, citing not only poor business conditions but also rapidly deteriorating market conditions for paper products. Georgia-Pacific Corp. posted a 29.1% increase in second-quarter earnings to $71 million, but this included substantial income from the sale of tax benefits and a natural gas royalty interest.

Canadian profits plummet. Continued weak pulp and paper demand combined with the depressed building materials market caused earnings of Canadian pulp and paper companies to deteriorate further in the second quarter, with most western companies posting losses, according to reports from ten producers. The 11 firms reported earnings down an aggregate 89%, while sales fell 15%—and this was despite a substantial benefit from favorable exchange rates.

Losses for the quarter were sustained by six companies, while all but one of the remaining five reported substantial earnings declines. Weak demand for pulp and newsprint, flat or eroding prices, and rising costs were blamed for the poor performance. Western firms, in particular, were also hurt by the depressed wood products market and heavy debt charges.

U.S. PAPER/FOREST PRODUCTS RESULTS
Second quarter ($000)

Paper companies	Sales	Change 1982/81	Earnings[1]	Change 1982/81
Chesapeake	$56,652	18.7%	$1,763	75.3%
Clevepak	29,200	3.6	1,259	9.3
Consolidated	132,397	1.9	10,874	19.1
Crown Zellerbach	759,400	7.8	11,900	42.8
Diamond	237,934	12.2	4,420	45.0
Federal Paper	114,701	2.6	4,923	44.6
Fort Howard	136,796	17.5	22,385	12.4
Glatfelter	62,454	14.2	4,773	12.6
GN Nekoosa	458,200	7.2	15,200	29.2
Hammermill	312,569	0.6	10,535	23.1
Intl. Paper	1,030,000	25.7	41,200	51.5
James River (4/25)[4]	207,098	1.1	6,708	39.4
Kimberly-Clark	725,300	1.0	58,900	5.7
Longview (4/30)[4]	156,058	2.7	5,420	59.5
Mead	703,718	6.9	(998)	n.m.
Mosinee	50,078	15.3	994	39.5
Pentair	71,954	96.5	3,261	84.2
[illegible]	64,800	31.7	(165)	n.m.
St. Regis	651,625	15.6	17,106	67.1
Scott	587,839	3.2	29,251	7.1
Sonoco	137,553	2.3	7,742	35.5
Sorg	19,689	12.3	(396)	n.m.
SW Forest	140,531	34.3	(5,553)	n.m.
Stone Container	104,369	1.4	2,307	63.5
Union Camp	369,511	12.4	33,722	37.1
Wausau (6/30)[4]	46,236	12.5	505	66.4
Westvaco	376,888	4.4	17,007	32.1
Willamette	234,173	10.8	(816)	n.m.
Total	**7,831,906**	**−9.5**	**308,506**	**−40.9**
Forest Products				
Boise Cascade	740,910	8.9	(8,440)	n.m.
Champion Intl	950,055	10.8	11,524	74.9
Georgia-Pacific	1,420,000	1.4	71,000	29.1
Louis. Pacific	226,050	23.5	(4,260)	n.m.
Pope & Talbot	70,892	10.2	962	63.5
Potlatch	205,665	9.2	8,126	35.9
Weyerhaeuser	1,091,131	7.7	26,143	65.1
Total	**4,705,203**	**−7.5**	**105,055**	**−53.5**
U.S. total	**12,537,109**	**−8.8**	**413,561**	**−44.7**

CANADIAN PAPER INDUSTRY RESULTS

Abitibi	C$416,246	10.7	C$25,300	39.8
B.C. Forest	216,000	15.1	(12,310)	n.m.
Con. Bathurst	371,900	1.7	17,500	35.4
C-Z Canada	171,400	11.5	(6,400)	n.m.
Domtar	424,900	11.5	2,700	77.5
Fraser	99,400	3.6	(1,186)	n.m.
Great Lakes	109,164	20.9	5,427	74.2
Mac. Bloedel	466,800	34.1	(11,100)	n.m.
Rolland	40,800	17.4	(773)	n.m.
Scott	93,600	0.8	4,200	7.4
Weldwood	109,049	28.4	(3,170)	n.m.
Total	**2,519,859**	**−15.2**	**18,181**	**−88.6**

1. Income after taxes from continuing operations excluding [illegible] and nonrecurring items in both years.
2. 1981 figures restated by company.
3. 1981 figure excludes sales of $[illegible] million from Canadian International Paper Co., which was sold in the fourth quarter of 1981.
4. Period ended. Figures for James River are for fourth quarter, Wausau for third quarter.
() = loss; n.m. = not meaningful.

Agri-Timber merges Interstate units

Agri-Timber Inc., a holding company owned by William F. Belote of Dublin, Ga., announced that it has merged its forest products interests into a new company, Interstate Resources Inc., to be based in Cincinnati, Ohio. Assets involved include Interstate Container Corp.'s 550-tpd linerboard mill at Riceboro, Ga., Interstate Container Corp.'s 100-tpd recycled corrugating medium mill at Reading, Pa., and three box plants, as well as Newport Timber Corp., a biomass fuel supply firm.

The new company is owned jointly by Belote and Georges N. Frem, chairman of Indevco, an international industrial development company based in Lebanon with interests in packaging, consumer products, housing, and hotels. The value of the transaction was not disclosed.

Last year Belote, through Agri-Timber, acquired all the stock of the three operating companies in the merger (P&P, July 1981, p. 21). Belote owns or controls over 200,000 acres of timberland in Georgia, Florida and South Carolina, sawmills and plywood plants in those states, and timberland in Central America.

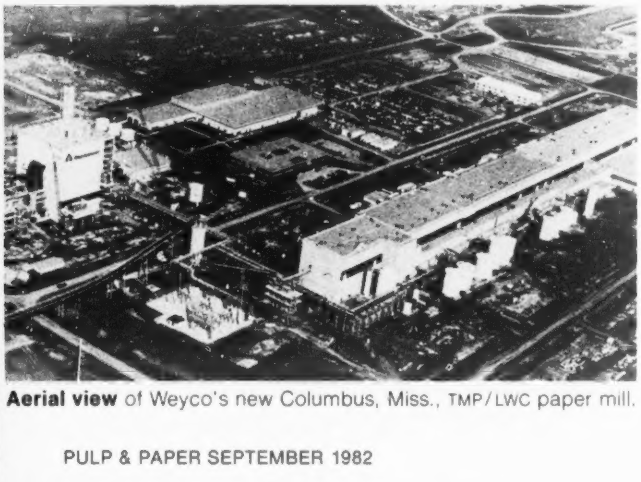
EXPANSION

Weyco starts up Columbus machine

Weyerhaeuser Co. has started up the 175,000-tpy coated groundwood paper machine at its new Columbus, Miss., mill, the company confirmed. The 500-tpd, 289-in.-trim Beloit fourdrinier will be supplied with pulp from a 260-tpd Bauer thermomechanical pulp mill, along with a similar amount of bleached kraft pulp from the company's New Bern, N.C., mill.

An off-machine trailing-blade coater will be used with two supercalenders to produce a sheet in the 40- to 45-lb basis weight range. The mill also has a hog fuel boiler and two turbines with combined 30- to 35-Mw capacity.

This represents Weyco's first effort to produce coated groundwood. The new mill may eventually have as many as three machines, with the second being an uncoated free-sheet unit and the third producing coated groundwood. The second and third machines have been postponed indefinitely due to economic conditions (P&P, Apr., p. 27).



Aerial view of Weyco's new Columbus, Miss., TMP/LWC paper mill.

Major coated groundwood (No. 4 and No. 5) capacity expansions—the end of a binge

Announced or completed	Location	Annual short tons	Startup date
Consolidated*	Whiting, Wis.	95,000 (net)	1979
Kruger	Trois Rivieres, Que.	70,000	1979
GN Nekoosa	Millinocket, Maine	45,000	1980
Midtec*	Kimberly, Wis.	125,000	1980
International Paper*	Jay, Maine	112,000	1980
Crown Zellerbach	West Linn, Ore.	65,000	1980
	St. Francisville, La.	12,000	1980
Fraser	Madawaska, Maine	80,000	1980
Boise Cascade*	Rumford, Maine	160,000	1981
Nitec	Niagara Falls, N.Y.	70,000	1981
Consolidated	Wisconsin Rapids, Wis.	13,500	1981
Mead*	Escanaba, Mich.	200,000	1982
St. Regis*	Sartell, Minn.	170,000	1982
Weyerhaeuser*	Columbus, Miss.	175,000	1982
Pentair	Niagara, Wis.	30,000	1983-84
Proposed			
Blandin*	Grand Rapids, Minn.	175,000	n.a.
Weyerhaeuser*	Columbus, Miss.	n.a.	n.a.

*New machines. Source: *P&P Project Report*

St. Regis LWC machine on-line

Uncoated paper was successfully being run through a new 480-tpd lightweight coated paper machine that was started up on July 1 at St. Regis Paper Co.'s Sartell, Minn., mill, and salable uncoated paper was expected to be produced by the new No. 3 paper machine soon after. Coated paper production was not expected to begin until this fall.

The new 320-in.-trim, 3500-fpm Beloit fourdrinier has two on-machine coaters. It is intended to produce 34-lb LWC. A new 400-tpd thermomechanical pulp mill, which also came on-line in early July, will supply pulp to the new machine and eventually also supply the two other paper machines at the mill, which make 280 tpd uncoated paper.

The $250-million project, begun in May 1980, included $200 million for the paper machine and a power boiler, effluent treatment system, paper warehouse, water filtration system, supercalenders, winders, and roll-grinding building. The $50-million TMP mill added a woodroom.

Portals starts up Georgia mill

Portals Inc.'s $15-million, 2500-tpy security papers mill at Hawkinsville, Ga., started up in July, according to company president David Mason. The mill marks the entry of parent company Portals Ltd. of the U.K. into the North American market (P&P, Nov. 1980, p. 13).

The Hawkinsville mill will produce both currency paper for worldwide export and security paper to be used by the travelers check industry for U.S. markets, Mason said. The mill's single cylinder-mold machine is a composite make from several western European manufacturers, and will utilize cotton pulp from southeastern U.S. mills and woodpulp from Canada. Further equipment details were unavailable.

Uncoated groundwood paper: Weak economy, pressure from other grades hurt demand

Statistics:	1980	1981	1982e
Production, 000 tons	1498	1441	1412
Capacity, 000 tons	1624	1658	1774
Utilization rate, %	92.2	86.9	79.6
Imports, 000 tons	688	650	610
Exports, 000 tons	101	120	138
Apparent U.S. consumption			
000 tons	2085	1971	1884
lb/capita	18.73	17.54	16.59
000 tons/$billion real GNP (1972)	1.41	1.31	1.26

*All tons are short tons
e=estimated

Grade structure: Uncoated groundwood papers are similar to newsprint in terms of physical properties, and the two grades constitute the major low-cost printing papers. Brightness is higher for uncoated groundwood—typically 64 to 70 Elrepho for uncoated groundwood, compared with 56 to 62 for newsprint. Endurance and printing characteristics are better than for newsprint, but not on a par with coated groundwood paper. Typical end-uses include catalogs, directories, periodicals, advertising circulars, and business papers, such as computer printout. Basis weights range from 20 lb to 45 lb/3300 ft².

Production/capacity: Production of uncoated groundwood papers has fallen since 1979, and American Paper Institute figures show output dropped another 5.4% in the first five months of 1982 to an annual rate of 1.40 million short tons. Capacity rose by 7.0% between 1981 and 1982 with the 1981 startup of a new 165,000-tpy machine at Madison Paper's Madison, Maine, mill, but is then expected to remain virtually flat at least through 1984, rising to only 1.784 million tpy in that year.

Canadian Pulp & Paper Assn. figures place Canadian capacity at 865,000 short tpy in 1982, but P&P estimates true Canadian capacity to be far higher, since Canadian companies traditionally underreport to avoid tariffs on paper shipped to the U.S. A more accurate estimate would be 1.96 million tpy in 1982, rising to nearly 2.1 million tpy by the end of 1983.

In addition to the questionable nature of official Canadian statistics, the gathering of reliable capacity estimates is also complicated by the ability of some mills to swing between uncoated groundwood, newsprint, and coated groundwood, depending on fiber mix and use/nonuse of coaters. However, P&P believes its company capacity list represents a reliable picture of capacity normally dedicated to this grade.

Outlook: Uncoated groundwood mills have fallen victim to two problems since 1979: stagnation in the U.S. economy has slowed growth of many major end-uses, and a rapid jump in capacity of newsprint and coated groundwood papers has put price pressure on uncoated groundwood from above and below. Consumption will end 1982 at about 15.7% below 1979 levels, with loss of market share on the part of uncoated groundwood showing up in nearly every end-use category. Any pickup in demand will probably have to await a recovery in consumption of Sunday newspaper supplement, catalog, directory, and computer-printout, not likely to occur before late 1982 at the earliest.

Pricing: Mills had some success at passing along price increases during late 1981 and early 1982 despite soft demand—directory paper prices, for example, rose by 12%, to 12.4%, although rotonews prices moved up only 3%. Prices for 25-lb roto catalog are ($/short ton): 1974, 320; 1975, 320; 1976, 345; 1977, 405; 1978, 425; 1979, 468; 1980, 495; 1981, 551; 1982, 551. Typical prices for 30-lb standard rotonews printing paper: 1978, 345; 1979, 386; 1980, 427; 1981, 490; 1982, 505.

Estimated capacities of major companies are:

	Annual capacity (000 tons)			Capacity N. American market
	U.S.	Canada	Total	%
1. Abitibi-Price Inc.		425	425	11.4
2. Great Northern Nekoosa	402		402	10.8
3. CIP Inc.		380	380	10.2
4. Consolidated Bathurst Ltd.		352	352	9.4
5. MacMillan Bloedel Ltd.		347	347	9.3
6. Boise Cascade Corp.	40	260	300	8.0
7. St. Regis Paper Co.	225		225	6.0
8. Domtar Inc.		163	163	4.4
9. [illegible] Inc.	135		135	3.6
10. Madison Paper	130		130	3.5
11. Crown Zellerbach	130		130	3.5
12. Kimberly-Clark Corp.	93	28	121	3.2
13. Bowater Inc.	70		70	1.9
14. [illegible] Paper	57		57	1.5
15. Wausau Paper Mills	30		30	0.8

Subsidiary of [illegible] Corp.
[illegible]

North American capacity (1982): **3.729 million tons** (U.S.: 1.774; Canada: 1.955)
Capacity share of top five companies: 51.1%
Capacity share of top ten companies: 76.7%

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Energy-efficient design efforts are paying off for paper industry

Modernization, upgrade projects during the past ten years have focused on more efficient use of energy, byproduct fuels, process steam, and equipment

By JAMES M. TUCKER JR.

☐ The past decade has been a critical period for the pulp and paper industry as environmental restrictions and rapidly escalating energy costs have placed substantial strains on its fiscal health. However, the paper industry has utilized energy better and achieved greater efficiency from available energy sources than most, if not all, of the major industries. More than 95% of all large pulp and paper facilities in the U.S. now have in-plant power generation. The industry's ability and willingness to devote effort to further increase the use of available in-plant energy sources and enhance purchased energy use has enabled it to reduce energy problems to manageable size and remain competitive in the world market.

This article discusses specific energy-related gains made by the paper industry during this critical period and examines, mainly from a design viewpoint, those areas of the process where major improvements have been made. Particular attention is given to power and recovery, the pulp mill, and process control, since these areas are most often targeted in upgrade/modernization projects designed to improve overall energy efficiency.

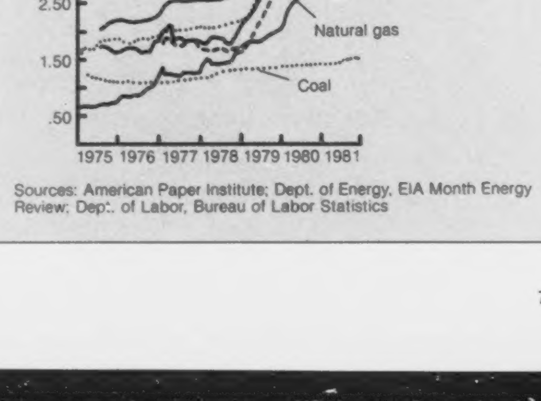
Maintaining economic balance

The magnitude of the energy problem is illustrated in Figure 1, which presents a comparison by the American Paper Institute (API) of selected fuel costs for the past seven years (1975-1981). These trends represent average national costs in general industry and are not limited to the pulp and paper industry. As can be seen, the cost of fuel oil has increased approximately 250% since 1979.

The pulp and paper industry has reacted to soaring energy costs in a very positive way. Figure 2, prepared by API, shows the cost of purchased fuels and electric energy as a percentage of the total value of shipments by pulp, paper, and paperboard mills for the past ten years (1972-1982). Rising energy costs have increasingly become one of the major components of operating cost, but the potential impact on profitability has been substantially reduced by improved energy utilization and efficiency.

In Figure 3, changes in energy use and paper industry production for the same ten-year period are compared with other selected industries. The comparison is very favorable for the paper industry. Figure 4 presents the average use (in Btus) of fossil fuels and purchased energy/ton of product for the 1972-1981 period based on reports from 92% of the pulp and paper industry. The reported 24.8% reduction in purchased energy use/ton of output is increased to 30.4% when the net effect of changes in capacity utilization, environmental energy use, and fuel mix are taken into account.

Figure 1. **Comparison of selected fuel costs (million Btus)**



Sources: American Paper Institute; Dept. of Energy, EIA Month Energy Review; Dept. of Labor, Bureau of Labor Statistics

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Mr. Tucker is vice-president of engineering, Simons-Eastern Co., Atlanta, Ga.

The quarterly data reported for 1981 and presented in Figure 5 indicate that the downward trend in energy use/ton is being maintained despite the slowdown in capacity utilization. It should also be noted that self-generated and residue sources of energy accounted for 50.1% of the industry's total energy consumption during 1981, compared with 40.5% in 1972. Use of fuel oils by the paper industry decreased by 40.4% for this same period. Figure 6 presents API data on use of self-generated energy for three years: 1972, 1980, and 1981.

Current status of energy utilization

To achieve the pulp and paper industry performance briefly outlined above, substantial contributions had to be provided through utilization of byproduct fuels. The chemical recovery boiler in a kraft pulp mill usually provides more than 50% of the mill's requirements for process steam from the combustion of organic matter in spent cooking liquor. Bark and woodwaste from woodyard operations are additional sources of in-plant fuel.

These inherent, inexpensive fuel sources and the isolated location of many mills have historically resulted in substantial in-plant steam and power generation by pulp mills. However, management's continued demand for product and process improvements resulted in a long-term trend toward increased power consumption with, in many instances, an attendant reduction in process steam usage. Contributing to this process steam/electric power imbalance were:

- Improvements in manufacturing processes and equipment design which provided more efficient steam usage
- Increased use of higher pressure steam in the manufacturing processes
- Increased use of electric motor drives for process equipment
- Increasingly stringent requirements for pollution control.

At the same time, process improvements, such as increased pulp yield and better utilization of all fiber sources, have reduced the quantity of byproduct fuels available.

Principles and accomplishments

The underlying principles or objectives on which all energy-saving accomplishments have been based are:

- Make better use of existing plants by reducing energy losses
- Make existing manufacturing processes and equipment more efficient by reducing energy needs
- Develop and apply more energy-efficient technology to process and equipment design.

To date, the industry's achievements are primarily the result of significant progress by numerous mills in the first two areas. Work on development and application of new technology is also yielding dividends, although its impact on the industry at this stage is still minimal.

Energy conservation efforts have been rewarding and have covered every energy-consuming process in the mill from woodyard to pulp dryer. Process and equipment improvements have also yielded substantial dividends, particularly for new plants where improvements in evaporator and boiler design have permitted increases in boiler capacity as well as design pressure and temperature.

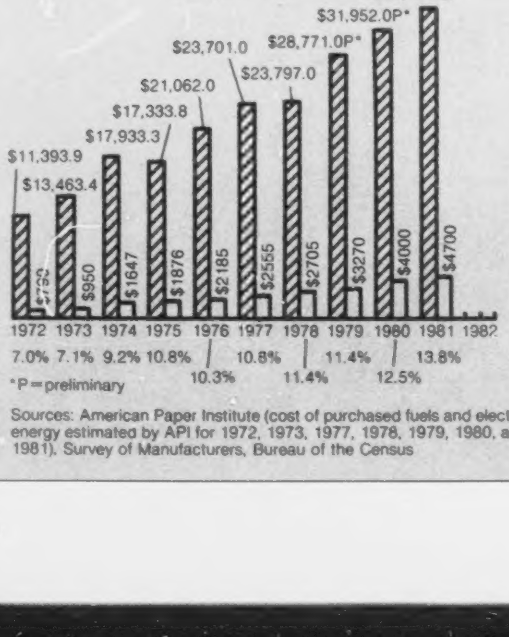
A major factor in achieving improved power-plant performance has been the changing nature of steam and power demands for pulp manufacture. The historic "swings," or load fluctuations, of batch processes greatly limited the number of power cycles that could be utilized to economically satisfy a pulp mill's requirements for steam and electric power. The substantial reduction in amplitude and frequency of load variations, through application of continuous processes and improved controls, has greatly expanded the options available to the designer of a pulp mill facility in the 1980s.

General savings

In a modern pulp mill, no piece of auxiliary equipment is more visible or more critical to operating success

Figure 2. **Cost of purchased fuel and electric energy as a percentage of value of shipments in the pulp and paper industry**

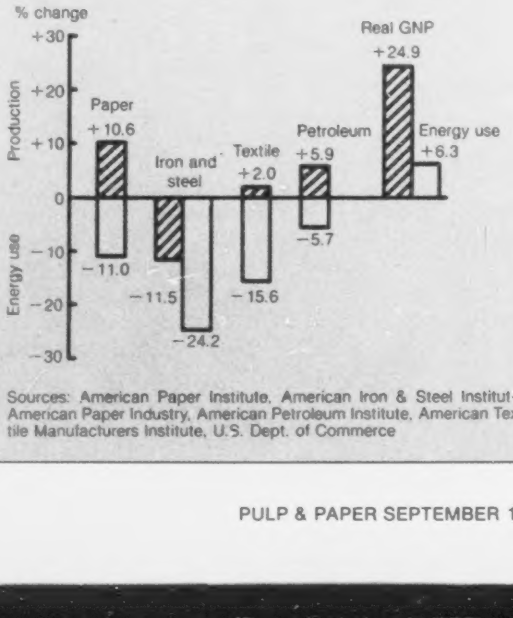
(millions of dollars)



*P = preliminary

Sources: American Paper Institute (cost of purchased fuels and electric energy estimated by API for 1972, 1973, 1977, 1978, 1979, 1980, and 1981), Survey of Manufacturers, Bureau of the Census

Figure 3. **Changes in energy use and production for selected industries between 1972 and 1980**



Sources: American Paper Institute, American Iron & Steel Institute, American Paper Industry, American Petroleum Institute, American Textile Manufacturers Institute, U.S. Dept. of Commerce than the pump. The pump is also frequently one of the greatest sources of energy waste because of oversizing. In an attempt to be conservative, the designer often selects pumps with excessive margins in both capacity and total head. The magnitude of possible energy savings from this seemingly mundane item can be placed in proper perspective by the results of a recent pump survey conducted at a 750-tpd pulp mill.

The mill had asked for bids on 250 pumps in 93 mill services. Data on pumps from four manufacturers were compared for each of the 93 services according to the specific requirements. In calculating potential differences in energy usage between the offerings, the survey treated the pumps available from each manufacturer as a group. The selected group provided an average improvement in efficiency of 5.6%. The difference appears small, but the resulting 531-hp reduction would provide an annual savings in energy costs of more than $130,000.

Impressive savings have also been achieved from the use of variable-speed drives on pumps to eliminate energy losses caused by throttling control valves. Successful variable-speed drive applications have been made for both new and existing installations.

A reduction in energy losses can also be obtained by improved insulation on hot vessels and piping where paybacks of one to two years have been obtained, and by improved recovery and reuse of low-grade heat generated in the pulp-manufacturing process.

However, the greatest gains have been achieved by designing new process systems to use less water and lower-pressure steam and to operate at a more uniform rate. These objectives have been attained by applying both old and new ideas and by using the improved control systems now available. The computer has been a major factor in these accomplishments. It has served well in analyzing processes, design of equipment and facilities, and control of operating systems.

Power cycle fundamentals

A "good" power balance for an industrial power cycle is achieved if power losses are minimized and power acquisition is based on a correct evaluation of energy costs and availability. Generally, the manufacture of pulp and paper uses processes that enhance the economics of in-plant generation of heat and mechanical power, since its processes require large quantities of heat obtainable from steam at low to moderate energy levels.

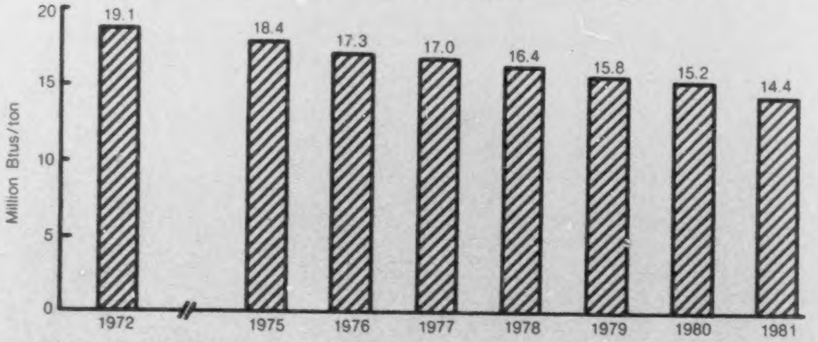
This feature provides the pulp mill owner with the opportunity to obtain inexpensive mechanical power to generate electricity by producing steam at high energy levels and extracting the resultant excess energy with steam turbines. In general, power plant designers have kept pace with the trend toward higher ratios of electric power to process steam usage by designing for higher initial steam conditions. This approach has permitted more by-product power to be generated from each pound of steam required by the manufacturing processes for heating purposes. Conditions limiting the electric power generated in this manner are those that limit the boiler superheater outlet conditions and steam turbine efficiency, such as:

- Boiler and turbine metallurgy are restricted for all practical purposes to a maximum steam temperature of 1000°F
- Operation of a chemical recovery boiler at pressures exceeding 1000 to 1250 psi involve additional safety hazards unless the unit is provided with special metallurgy or extraordinary maintenance to prevent fireside corrosion of furnace tubes
- Turbine efficiences become progressively lower as higher pressures are used
- A minimum flow of steam is required to maintain process steam control
- Established in-plant utilities may restrict the use of more favorable steam conditions for a plant expansion.

Recovery boiler

The modern recovery boiler is the result of repeated design modifications in response to operating difficulties, environmental constraints, operating hazards, and economic demands. Several units placed in operation during 1982 have been designed for operation at 1500 psi, and the largest unit will have a burning capacity of 200,000 lb/hour of black liquor solids. The capacity rating of a recovery boiler reflects its initial—and still critical—role as a part of the chemical recovery system. Critical to its satisfactory operation and use as a steam generator is a

Figure 4. **Pulp, paper, and paperboard industry's average use of fossil fuel and puchased energy/ton**



	1972	1975	1976	1977	1978	1979	1980	1981
Improvement, %		−4.0	−9.8	−11.3	−14.4	−17.3	−20.8	−24.8
Adjusted improvement, %		14.8	14.0	16.5	18.4	20.7	26.2	30.4

Source: American Paper Institute

constant supply of black liquor fuel properly concentrated for optimum firing. To achieve this goal, reduce the emission of pollutants to required levels, maintain personnel and equipment safety, and increase the generating pressure to a more economic level, the following features are now provided on recovery boilers:

- Black liquor fuel concentrated to approximately 65% to 67% solids and sprayed directly into the furnace cavity
- All welded furnace construction with the lower part of the furnace constructed of composite tubes to improve corrosion resistance
- An extended economizer with parallel gas passages
- A two-chamber, high-efficiency (99.65%) electrostatic precipitator of wet-bottom design with a stainless-steel liner to clean fluegases, and an energy-management system to automatically adjust power to maintain desired opacity
- Screen tubes and baffles in boiler bank eliminated and spacing increased on superheater elements to minimize plugging; furnace height and volume increased to improve oxidation of combustibles and reduce carryover to boiler bank
- Sootblower speed increased from 70 to 100 in./min
- More levels of vibration snubbers for boiler bank tubes
- Maintenance beams installed through the rear wall and nose baffle, or contained in nose cavity with telescoping-type beam
- Vertical buckstays provided on large units for furnace design pressure of about 26-in. water gauge
- High primary air to help control the shape of the smelt bed
- High-energy arc igniters used for auxiliary burners
- Hotter bed temperatures used to reduce TRS emissions with 400°F primary air supply
- Green liquor recirculation eliminated to improve reduction efficiency
- Variable-frequency a.c. drives for black liquor fuel pumps
- Atmospheric rapid-drain system for safe shutdown in case of tube rupture
- Forced-draft fan placed high in building to use hot air, which accumulates in upper levels
- Insulation increased to 6-in. thickness to decrease heat losses
- Computer control of combustion and liquor solids
- Chemical ash tank to get sluice from economizer hoppers and return to precipitation wet bottom or level tank
- Scrubber for dissolving tank(s) vent.

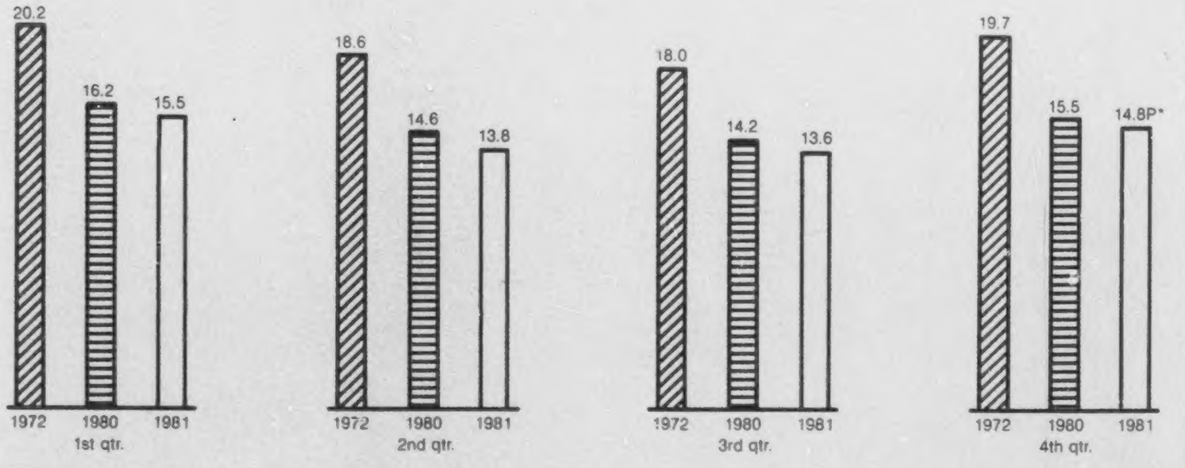
Power boiler

Required process steam in excess of that available from the recovery boiler is usually provided by a combination bark- and coal-, or bark- and oil-fired boiler. High oil prices and governmental regulations have almost eliminated the latter option.

The primary features of a modern bark- and coal-fired boiler are:

- Coal pulverized and injected through a coal burner directly into the furnace
- Bark and refuse hogged and fired using a spreader stoker and travelling grate
- More levels of overfire air and a higher percentage of overfire air to total air
- Live-bottom bins with metering screws for control of bark feed to boiler
- A fan or separate air supply for NO$_x$ control
- Furnace volume heat release reduced to between 15,000 and 20,000 Btus/hour/ft^3
- Stoker heat release rate for woodwaste using alloy grates ranging from 1.0 to 1.25 million Btus/hour/ft^2
- SO$_2$ scrubbers, of either wet or dry design, to control SO$_2$ emissions (some of the designs have the capability of attaining desired performance with a pressure drop of less than 10 in. water gauge)
- Gravimetric coal feeders to improve combustion control
- A high-efficiency (99.5%) electrostatic precipitator for control of particulate emissions
- Reinjection of unburned char

Figure 5. **Fossil fuel and purchased energy use/ton actual average use**
(million Btus)



Source: American Paper Institute *P = preliminary

- Computer control and monitoring of combustion.

Black liquor evaporators

Concentration of used cooking liquor to a solids level that will provide efficient operation of the recovery boiler has traditionally been accomplished with a 5- to 6-effect evaporator set. The need to concentrate black liquor to 65% to 67% for direct firing in the recovery boiler has resulted in an additional stage or concentrator, generally installed in duplicate with switching valves to permit frequent cleaning.

Removal of water from kraft black liquor uses about 5.2 million Btus of energy/ton of pulp. Approximately 60% of this energy is used in the multieffect evaporator to remove about 90% of the water. The remainder is used in the recovery boiler at a 1:1 economy to remove the final 10% of the water. Increasing the liquor solids content to the furnace from 65% to 80% would provide an additional 1.1 million Btus/ton of heat for steam generation and use only 0.4 million Btus/ton for evaporation. International Paper Co. has investigated the feasibility of applying thin-film evaporation techniques in order to concentrate black liquor to higher solids levels. Pilot plant studies confirmed the technical feasibility of attaining up to 90% solids with thin film technology; but the investment is only marginally attractive now.

Significant savings in evaporation have already been achieved by several mills working with the evaporator feed liquor. The basic principle employed in these efforts has been to minimize dilution. The actions taken include: the use of mechanical seals on pumps to eliminate dilution by gland sealing water, the exclusion of clean waters (such as eye-wash fountains and cooling waters) from black liquor recovery sumps, preevaporation of black liquor with digester blow steam, and more efficient pulp washing equipment or additional washing stages to reduce the water dilution factor.

Replacement of standard rising film evaporation with a falling film system has been another effective approach to reducing energy usage. The gains available from a falling film evaporator system result from its ability to transfer heat with only a few degrees of temperature difference between the condensing vapor and black liquor at its boiling point. As can be seen in Figure 7, a falling film evaporator has high heat-transfer coefficients at almost zero temperature difference. This unique feature makes it possible to design an 8- to 10-effect evaporator system or to reduce the pressure of the steam supplied to the first effect of a 6-effect evaporator from 50 to 15 psi. An 8-effect, falling film evaporator with 200°F feed liquor will produce a 65% to 68% solids product liquor at a steam economy of 7.8 lb of evaporated water/lb of steam used. A standard rising film 6-effect evaporation system followed by a 2-effect concentrator provides a steam economy of 4.8 lb of evaporated water/lb of steam used with the same feed liquor.

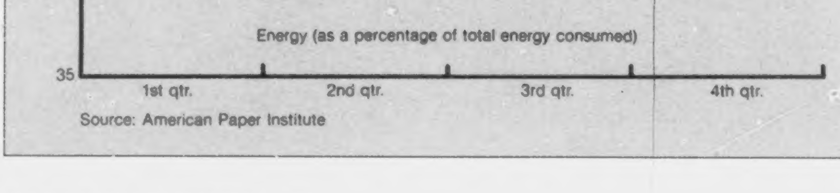
Recausticizing

The lime kiln has been an obvious target as a potential source for energy savings, and efforts in this area have not gone unrewarded. The most noticeable difference in new kiln installations is the addition of satellite product coolers at the discharge end. But care should be taken in their application, since coolers may not provide the maximum energy savings available when the complete liquor-making system is considered. Slakers should be used at the maximum temperature to optimize reaction rate and produce white liquor that will require a minimum of steam to reach cooking temperature in the digesters. The objective in this area should be an overall reduction in energy usage by the recausticizing system.

Effective energy-saving modifications and additions include:

- Reduction of radiation losses from the kiln shell through improved internal insulation and aluminum paint on the shell exterior
- A heat-recovery hood over the kiln hot end to serve as an air intake plenum for the kiln's secondary air fan
- Use of dirty condensate for washwater
- Improved insulation on tanks and piping
- Use of an electrostatic precipitator for particulate removal, or heating makeup and washwater in a kiln's scrubber
- Reduced leakage from hoods, ductwork, conveyors
- Improved control of the total operation involving recausticizing.

Figure 6. **Pulp and paper industry self-generated energy as a percentage of total energy consumed: 1972, 1980, 1981**



Source: American Paper Institute

Woodyard

The most significant change that has taken place in the woodyard in response to rising energy costs has been in chip and bark conveyor design. Pneumatic conveying systems, with their high-energy requirements, are now generally restricted to special applications, and the more energy-efficient belt conveyors have returned to favor.

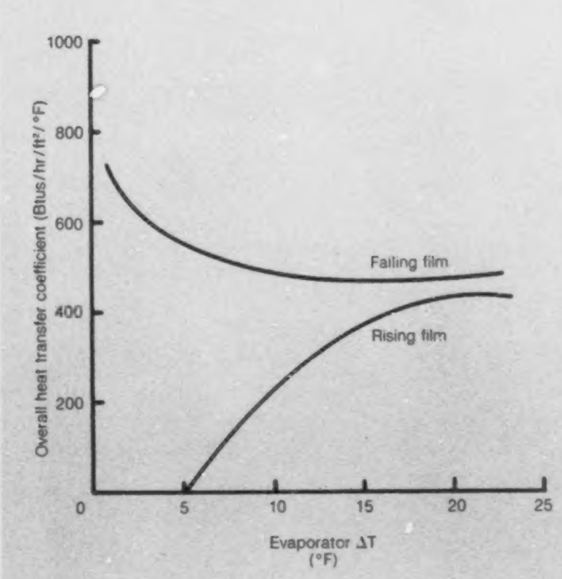
Improved chip screening has also provided dividends. The use of high-capacity multiple-stage disc screens has permitted removal of knots and other coarse rejects from the chip feed to the digesters. The result has been an increase in pulp yield as well as quality, and reductions in cooking steam and energy use in screening and refining.

Digesting

The increased need to reduce energy usage and to minimize fluctuations in steam demand from batch digesters has encouraged the most significant progress in digestion technology since the continuous digester arrived on the scene in the 1950s. Some of the improvements, such as steam accumulators and indirect heating of cooking liquor, are not new ideas, but today's economic environment has made them much more attractive. The steam accumulator—or thermal energy storage (TES) system—dates back to developments made between 1910 and 1920 and has been extensively applied since then in Scandinavia, where high energy costs have prevailed for a long time.

The on/off operation of batch digesters imposes a varying demand on steam supply. Even when multiple units are carefully scheduled, variations in steam demand can be rapid and of significant magnitude. A TES system has the potential to meet these short-term energy variations, which may typically last only 15 to 30 min. Energy is stored, not exhausted into the atmosphere during periods of surplus supply, and is removed from storage during periods of shortage. The TES system is estimated to provide an average energy savings equivalent to about 0.03 barrels of oil/ton of pulp production.

Figure 7. **Comparison of heat transfer for falling and rising film evaporators**



Other improvements in the batch digester system—with significant energy savings—include the use of blow steam to preheat cooking liquor, computer control of the cooking cycle, separation of hot- and warm-water accumulator tanks in the blow heat recovery system, and dual-pressure steaming of digesters. Dual-pressure steaming involves using a lower-pressure steam (for example, 50 psi) for initial heating of the digester contents with the normal 150- to 165-psi steam supply used for increasing the temperature to the desired cooking level and maintaining it for the duration of the cook. The use of lower-pressure steam for process heating increases the heat drop available through in-plant steam turbines for electric power generation. An additional 8 kwh/1000 lb of steam can be generated by reducing the turbine back pressure from 65 psi to 25 psi.

A major attraction of the continuous digester has been its lower total energy requirement for operation. This advantage, although reduced by advances in batch digester technology, is still substantial as a result of improvements. Some of these improvements include the use of a countercurrent flow of white liquor (to the flow of chips) and the use of digester blow and flash steam in the multiple-effect evaporators.

Washing and screening

Brownstock washing has traditionally been accomplished after batch digesters with a 3- to 4-stage drum system, and following continuous digesters with a diffusion washer system of one or more stages (frequently followed by a drum thickener).

Adding more washing stages further reduces the dilution factor and results in higher solids black liquor to the evaporators. A reduction in soda losses to the process sewer is also obtained. The most intriguing recent development in washing is the new fourdrinier-type washer developed by Georgia-Pacific Corp. This application provides the pulp mill engineer with the opportunity to design for six, eight, or ten wash stages with a corresponding reduction in the dilution factor and an increase in black liquor solids. Solids concentration of 22% or higher to the evaporators are easily achievable.

Effective energy-saving measures with existing washing equipment have included better use of hot water through separation and storage and the replacement of steam doctors on washer drums with air or mechanical doctors. The utilization of dirty condensate for shower water has also proven to be an effective energy-saving measure.

The emphasis on energy reduction is also reflected in both the application and placement of the pulp-screening operation. In general, the result has been a gradual movement of screens from a position after the washers to a position ahead of washing to provide the washing system with a relatively constant flow of debris-free stock. Placement of screening ahead of washing has also permitted several linerboard mills to obtain top liner stock by removing the soft, low-yield fiber produced in a single cook. A 2% increase in total fiber yield compared with dual cooking has been claimed.

Bleaching

Reduced water usage in the bleaching process has been a major contributor to reduced energy usage. This has been primarily done by applying countercurrent methods and generally closing up the operation. The average reduction in water usage from 20,000 gal/ton to 5000 gal/ton or less has provided other major advantages. This downward trend is expected to continue.

Process and equipment changes contributing to reduced energy requirements include the use of an oxygen stage and elimination of one or more conventional bleach stages, Kamyr Inc.'s unique displacement bleach system, and increased use of medium-consistency technology for all bleach stages. Energy savings have also been found in the design of washer/air-doctor systems through the use of recirculated air and in better heat-recovery systems. Reclaim of low-grade heat in cooling water, which would be subsequently sewered or removed in a cooling tower, is now recognized by all as nonproductive.

TMP pulping

During the 1970s, thermomechanical pulp (TMP) developed into the leading process for mechanical pulping, despite the increasing cost of energy. The improved strength of TMP compared with groundwood, and the ability of TMP in higher-quality grades to replace chemical pulp, have more than offset the higher energy costs incurred. The sharp upward increase in energy costs since 1979, however, has brought additional attention to the energy problem with generally satisfying results.

Energy is applied to the TMP process mainly as power to operate the refiner. A significant, but smaller, amount of energy is required in the form of steam for high-temperature, high-pressure treatment of chips prior to the primary refining stage. This preheat stage offers the first opportunity to conserve energy. Since more than 90% of the refiner motor energy input is converted to heat in the refiner, and nearly all of it is available as steam, heat-recovery systems have been developed to capture this heat and use it to generate high-pressure steam at an efficiency comparable to a commercial boiler.

Process controls

No area has been more rewarding in reducing pulp mill energy usage than the application of computer controls. Process heat consumption depends on the equipment used, process conditions, and operating rates. Minimum heat consumption will be required when all process variables can be optimized for the prevailing operating conditions. Establishing and maintaining optimum conditions in a dynamic situation requires collection and evaluation of a lot of data. The programmable controller has made this seemingly impossible task routine. The end result is a process more responsive to changing conditions and lower energy costs. ☐

REFERENCES

Anderson, R.S. Jr., and Roscoe, R.W., Thin-film evaporation of black liquor to high solids as an investment. *TAPPI*, Dec. 1981.

Edde, Howard, and Handby, Jay, Thermal energy storage system for the pulp and paper industry, *TAPPI*, 1981 Engineering Conference.

Karassik, Igor, Proper pump selection, sizing key to increased energy savings, *Pulp & Paper*, Feb. 1982.

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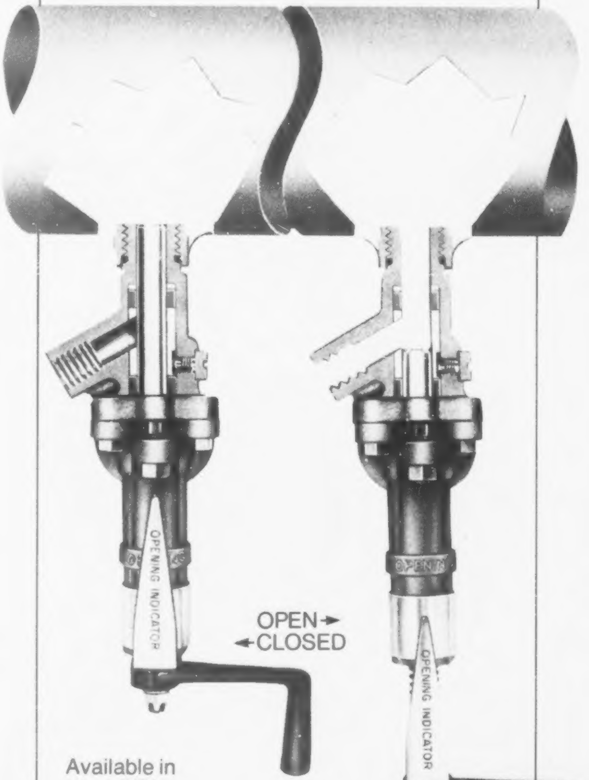

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Twin-wire formers: special survey details the technology now in use

PULP & PAPER's special report on twin-wire formers discusses recent design advances and summarizes installations in North America

By HAROLD M. CODY, Technical Editor

☐ Use of the twin-wire forming concept has advanced rapidly since its commercial beginnings in the late 1950s. Today, it is basically the standard method used on new machines for production of newsprint and tissue grades. There are currently an estimated 79 twin-wire units (excluding multi-ply board machines and special tissue/towel machines) in operation in U.S. and Canada.

To assess the current status of commercial twin-wire forming technology, PULP & PAPER obtained information from former manufacturers on the various units available worldwide. In addition, a detailed analysis of installations was done to provide an overview of the status of commercial installations and planned expansions.

Since the first twin-wire designs began to appear in the late 1950s, a variety of machines have been introduced, and most major paper machine manufacturers now offer a twin-wire former product line. Available units can be conveniently grouped into generic categories that generally describe the basic forming/drainage methods used. While special cases may warrant additional consideration, five basic groups are used in this article to classify the available commercial options. These are:

- Converging wedge (sometimes referred to as blade formers in reference to the drainage mechanism)
- Roll former with suction
- Roll former without suction
- Hybrid
- Multilayer with top fabrics.

The formers are categorized by tradename in Table 1.

When classifying the various wet ends using the above definitions, it becomes apparent that even the term twin-wire is not completely definitive. In most of the original machines, the stock jet from the slice was immediately deposited between two wires, or onto one wire with the second immediately sandwiching the sheet. Thus, the sheet was actually "formed" between the wires. But the simplicity of this definition gave way as new commercial options became available. This increasing complexity is exemplified by the most recent advance in this area, the hybrid unit.

In the hybrid area, various designs are available for rebuilding existing fourdriniers and for installations where an existing base fourdrinier is not used. In the case of a rebuild, the unit is positioned above an existing fourdrinier table some distance down the fourdrinier wire from the primary headbox. The sheet is initially dewatered on the fourdrinier table (some modifications to the original table may be necessary), and the top wire then contacts the felt side of the sheet for upward dewatering. Therefore, the sheet is not actually formed between the wires, and the term twin-wire former is somewhat inaccurate in this case. However, since these units incorporate similar concepts and since their

Table 1 **Twin-wire wet end options available by manufacturer and type of configuration**

Manufacturer	Converging wedge or blade former	Suction roll former	Roll former without suction	Hybrid former[1]
Beloit Corp	Bel Baie II		Twin-Wire tissue	Bel Bond
Black Clawson	Verti-Forma I,J,V			
Dominion Engineering		Papriformer		Dynaformer
Escher Wyss			Tisco Former	Twinformer[4], Twinco
KMW		Periformer MW	Periformer LWR	Periformer H
Valmet		Speed Former		Sym-Former F,N,R[3]
Voith		Duoformer C	Duoformer T	Duoformer H[2]/F

[1] The sheet is initially formed on a conventional fourdrinier-style table (in the case of a rebuild) followed by a second wire which contacts the top side of the sheet.
[2] The Duoformer H is a top-wire unit designed for a base fourdrinier.
[3] Sym-Former R is designed to be placed on an existing fourdrinier.
[4] Escher Wyss Twinformer is designed for rebuilding existing fourdrinier.
Note: This listing does not include the category "Multilayer with top fabric(s)," although there are twin-wire designs used for this application.

development is tied to the original units, they are considered twin-wire formers in this article.

There is also a wide variety of machine configurations where an additional wire, or wires, and additional headboxes are used in the manufacture of multi-ply board. These machines layer the various plies together, often using different furnish mixes. Machines of this nature will be discussed in general and some of the more interesting configurations noted, but all the various units available will not be detailed here.

(For a comprehensive report on all multi-ply forming units available, including detailed operating and technical considerations, see PULP & PAPER, Dec. 1978, pp. 89-104; or contact PULP & PAPER, Reprints, 500 Howard St., San Francisco, Calif. 94105.)

Table 2. **Distribution of paper machines in the U.S., Mexico, and Canada having twin-wire formers, by manufacturer and type**
(operating as of August 1, 1982)

Manufacturer	Former type	U.S.	Canada	Mexico	Total
Beloit	Bel Baie		2		2
	Bel Baie II	14	6	2	22
	Bel Bond[1]	5	1	1	7
	Twin Wire Tissue	8	1	2	11
Black Clawson	Verti-Forma LJ	3	6	2	11
	Verti-Forma V		1		1
Dominion Engineering	Papriformer	2	8		10
	Dynaformer		(3)		0
Escher Wyss	Tisco Former			1	1
	Twinformer				0
KMW	Periformer LW	7	2		9
	Periformer MW	6			6
	Periformer R		1		1
	Periformer H				
Valmet	Sym-Former F	3	(4)		3
	Sym-Former N	1	2		3
	Sym-Former R				0
	Speed Former				0
Voith	Duoformer C	1			1
	Duoformer F	(6)		1	1
	Duoformer H				0
	Duoformer T	1			1
Total		**51**	**30**	**9**	**90**

(1) There are five paper machines in the U.S. currently operating with Bel Bond formers. Three machines have a single unit, one has 2 units, and one has five units on boxboard.
(2) A second Bel Baie II is scheduled for a late 1982 startup at Ontario Paper, and two additional units may start up in late 1982 or early 1983 at New Brunswick International Paper.
(3) The first North American installation of the Dynaformer should start up in late 1982 at Inland Empire Paper Co., Spokane, Wash.
(4) Great Lakes Forest Products will bring the first Sym-former F in Canada on-line late 1982.
(5) Abitibi-Price is scheduled to bring the third Sym-former N on line later this year.
(6) The first Duoformer F in the U.S. will be installed at Union Camp's Eastover, S.C., mill.
Note: This list does not include twin-wire units designed primarily for multi-ply paperboard applications.

Machine distribution

As shown in Table 2, various machines have attained differing degrees of commercial acceptance in terms of the number of units now operating in North America. Table 3 illustrates that, although some specific concentration of the different types by grade produced does exist, there is considerable crossover. In the following discussion under each generic category, the various manufacturers' machines will be briefly described. In many cases, the prototype installations will be mentioned, and the distribution of operating units in North America will be reviewed. The design specifics of each unit, comments on applications, operating performance and speeds, and a schematic of each former follow the general discussion.

Generally, the advantages of twin-wire wet ends compared with the fourdrinier are: improved sheet quality, reduced two-sidedness, and better printing characteristics. Some general characteristics are inherent to each generic type, but operating specifics do vary depending on many factors. Typically, roll formers exhibit better retention than converging web units or fourdriniers, while converging web formers often exhibit better formation due to the same pressure disturbance characteristics that cause lower retention. The hybrid unit is actually an attempt to combine the benefits of the fourdrinier (that is, preforming the sheet on the single wire) and the reduced two-sidedness of the twin-wire. However, for producing grades such as coated paper, the fourdrinier will probably continue to be very competitive.

Converging web formers

The first commercial twin-wire formers to gain wide acceptance were the converging web-type formers. These units, which include Beloit's Bel Baie II and Black Clawson's Verti-Forma, are operating at more installations in North America than any other single former type.

Beloit's Bel Baie II concept was developed folowing that company's introduction of the Inverform, Twinverform, and the original Bel Baie former. Following the success of the Inverform in the late 1950s at St. Anne's Board Mill Co. Ltd. in the U.K., the next step in the Beloit program was the Twinverform.

The first commercial unit of this design was installed at Kimberly-Clark Corp.'s Niagara, Wis., mill in 1965. The mill is now operated by Niagara of Wisconsin Paper Corp., and the machine (No. 4) produces 145-in.-trim groundwood basestock for the production of coated No. 5. This unit also has the distinction of being the first commercial twin-wire former that was used for paper grades.

On the original Kimberly-Clark machine, the top wire unit had a forming box consisting of a solid, rounded nose piece, which the wire wrapped to contact the sheet. The sheet was supported at this point by the breast roll and bottom wire. Following the forming box on the top wire were 11 blades, 1.5 in. apart, each with a 0.5-in. face. About 18 to 20 in. of water vacuum was applied to the box for upward drainage.

The bottom wire run had a foil positioned 6 in. after the trailing edge of the top forming box. Six slotted flatboxes followed under the bottom wire, with the last flatbox positioned after the top wire turning roll. The two wires ran together for 14 ft before the top wire separated. Initial machine speeds were 1750 fpm to 1850 fpm. The machine produced a sheet with better formation, less two-sidedness (brightness, color, and ash), less wire

Table 3. **Number of formers producing various grades, by type of twin-wire** (U.S. and Canada only)

Grade	Type of former Converging wedge	Suction roll former	Roll former without suction	Hybrid
Newsprint, directory, groundwood specialties	23	10	1	6
Tissue/towel	0	5	20	0
Printing/writing	4	0	0	5
Kraft/corrugating medium	2	1	0	1
Boxboard	0	0	0	1

marking, and improved sheet quality when compared with its predecessors.

The next step in the evolution of the Beloit twin-wire line was the original Bel Baie former. The first commercially successful unit was installed as a rebuild of the No. 3 paper machine at Quebec North Shore (Q.N.S.) Paper Co. Ltd. in Baie Comeau, Que.

The No. 3 newsprint machine had a 264-in. wire, and trimmed 240 in. The Bel Baie former was positioned over a suction box on the existing 260-in. fourdrinier, which had been installed in 1964. The fourdrinier was shut down on June 23, 1969, and the first paper was made on the new machine on July 1. Startup speed was more than 2700 fpm, and for the three months following the startup month averaged better than 2800 fpm.

In this prototype installation, the slice jet enters the nip formed by the top wire (supported by an open wire-covered roll) and the bottom wire (supported by a breast roll and followed by a solid forming shoe). After the forming shoe, the wires wrap an open roll, where drainage occurs through the bottom wire and also through the top wire, due to centrifugal force as the wires wrap the roll. The wires then pass under a third open roll to a horizontal plane. Centrifugal force caused by the wrap of the third roll forces water through the bottom wire. Drainage on the horizontal wire section is aided by flatboxes, after which the top wire separates from the sheet.

In 1971, a second Bel Baie went into operation at the same mill. The new No. 4 machine was a much larger version of No. 3, and is still one of the world's largest twin-wire formers with a 386-in.-wire and a 360-in. trim. In all, five Bel Baie units similar to the Q.N.S. former were built.

The next-generation Bel Baie (designated by a II) introduced the vertical forming concept. The first commercial Bel Baie II was No. 9 paper machine at Jujo Paper Mfg. Co. Ltd. in Japan. The Jujo machine began producing directory grades with an ash content of 6% to 8% on Oct. 9, 1972. The machine has a 222.5-in. trim and a design speed of 2650 fpm.

About two years later, the first Bel Baie II to produce paper in the U.S. started up. In January 1974, the rebuilt No. 5 machine at International Paper Co.'s Mobile, Ala., complex began making 30 lb/3300 ft^2 newsprint. No. 5 has a hydraulic headbox, a wire width of 284 in., and was designed for speeds to 2800 fpm. The wires pass over a 200-in.-radius segmented forming shoe, followed by a low-vacuum suction box and a large-diameter, compartmentalized suction roll.

In 1976, Ontario Minnesota Paper Co. (now Boise Cascade) started up the first Bel Baie II in Canada at its Fort Frances, Ont., complex. The largest Bel Baie II operating in the world, and the largest twin-wire machine anywhere, is the 400-in.-wide unit operating at the Obbola AB linerboard mill in Sweden. This huge machine, which was started up in August 1975, has a maximum trim of 372-in. and can operate at speeds to 2000 fpm. It was probably the first twin-wire machine in the world specifically designed to produce linerboard, and the original machine had a Strata-Flo layered headbox, which was also reportedly the first installation of this technology.

More Bel Baie II units are operating worldwide, (and also in North America) than any other single former type. Reportedly, the fastest Bel Baie II is the 380-in.-wide North Pacific Paper Co. (Norpac) unit—one of two—in Longview, Wash., that has operated at speeds approaching 3900 fpm on newsprint. The Norpac machine is also equipped with an air dryer that is reportedly designed to stabilize the sheet, reduce wrinkling, and impart strength to the sheet prior to the conventional dryer section.

Bel Baie II formers in North America have widths ranging from 167 in. to 386 in. Only two units have widths less than 200 in., while nine are in the 200- to 300-in. range, and ten units have widths in excess of 300 in. The majority of the Bel Baie formers produce newsprint, and a few are used for production of fine papers and corrugating medium.

The Black Clawson version of the converging web former is designated the Verti-Forma. The first commercial unit started up at Canadian International Paper Co.'s Three Rivers, Que., mill on March 19, 1968, as a rebuild. The machine (No. 6) was originally built in 1923. The interesting technical feature of the original Verti-Forma design was that the sheet was formed vertically downward. In the I version, each wire has a couch roll. The sheet is formed and drained down between the two wires. Then one wire breaks off and returns back around to the breast roll. The carrying wire wraps its couch roll and transfers the sheet to the press section from the bottom, or underneath, side of the forming fabric.

In the next version of the Verti-Forma, the J configuration, the sheet is initially formed in a manner similar to the I configuration, but the two wires and sheet then wrap a single couch roll. This sandwich continues horizontally until the top wire wraps a turning roll and separates, with the bottom wire transferring the sheet to a pickup. Three units of this type are currently operating in the U.S., and six of these units are running in Canada. Widths range from 166 in. to 314 in.

The most recent Black Clawson version is the Verti-Forma V, which is radically different from the I and J units. The first commercial installation of the Verti-

Forma V started up in April 1982 at Consolidated Bathurst's mill in Trois Rivieres, Que. This 210-in.-trim unit is designed to produce groundwood specialties and directory grades. The sheet is formed vertically upward into a nip formed by the two wires, and drainage is accomplished by a number of deflectors. The sheet is then carried between the wires until it is transferred to a pickup felt.

Roll formers without suction

Another concept in twin-wire forming is dewatering the sheet between two wires as the sandwich wraps a roll or rolls. Roll formers that do not employ vacuum to augment drainage are used to produce tissue, towel, and absorbent grades. These machines tend to be very high-speed units, unless they are equipped with through-dryers. Operating speeds are in the 6000-fpm range, and design speeds approach 7000 fpm. The KMW Periformer LW of this type at the PWA Waldhof Co. mill in West Germany is reportedly one of the fastest machines in the world (see PULP & PAPER, Sept. 1981, p. 226), and runs at speeds in excess of 5800 fpm. The design speed of the original installation was 6560 fpm.

Examples of roll formers that do not have vacuum-augmented forming or couch rolls are the Beloit Twin-Wire Tissue, the KMW Periformer LW, and the Voith Duoformer T machines.

The Crescent former developed by Kimberly-Clark is not a true twin-wire former, since it forms the sheet between a wire and a felt. Its drainage mechanism is similar to that of a roll former with a solid forming roll, however, because it drains water through the wire, due to centrifugal force and wire tension developed as the wire wraps the roll. The Crescent Former is also a high-speed unit, and installations in the late 1960s were running at speeds exceeding 5000 fpm. The two original units, installed at Kimberly-Clark's Beech Island, S.C., mill, were operating in the 4500 to 4600 fpm range and had a design speed of 5000 fpm.

Seven KMW Periformer LW units are currently operating in the U.S., and two are running in Canada. The units operating on tissue and towel in the U.S. have wire widths ranging from 123 in. up to 216 in. Top design speed of the North American units is reportedly 6250 fpm. The Periformer LW uses an S-shaped, or zig-zag, dewatering configuration, which differs from the Beloit Twin-Wire Tissue or Periformer MW technology.

Eight Beloit Twin-Wire Tissue machines are now operating in the U.S. When both Canada and the U.S. are considered, the Beloit unit and the Periformer LW are tied for the most installations with an estimated nine operating machines each. On the Beloit machine, the sheet is formed around a forming roll, and the wires then separate without wrapping an additional roll.

One Voith twin-wire former, the Duoformer T, is operating in the U.S. with a solid forming roll. It started up in 1978 at Marcal Paper Mills Inc. in Elmwood Park, N.J. This 222-in.-wide, 5900-fpm (design speed) unit produces tissue. This machine has reportedly operated in excess of 6000 fpm this year.

The Escher Wyss Manchester version of the roll former without suction is the Tisco Former. The first unit of this type started up in December 1981 in Apizaco, Mexico, and is designed to produce tissue, towel, and napkin. This 116-in. unit has a design speed of 5250 fpm.

Suction roll formers

Suction roll formers, as the name implies, use a vacuum-augmented suction or couch roll arrangement to aid in sheet drainage. Examples of this type include the Dominion Engineering Papriformer, KMW Periformer MW, Voith Duoformer C, and the Valmet Speed Former.

In 1972, the world's first commercial Papriformer started up at the Kruger Inc. mill in Bromptonville, Que. This unit had a 174-in. wire, trimmed 161-in., and was designed for speeds to 2900 fpm on newsprint.

Southland Paper Mills Inc. (now part of St. Regis Paper Co.) brought the first U.S. commercial Papriformer installation on-line in 1974 to produce newsprint at its Houston, Texas, mill. This unit was much larger than the original Kruger installation, and had a 326-in. wire. There are eight Papriformers currently operating in Canada and two in the U.S., with wire widths ranging from 174-in. to 326-in. All of these units produce newsprint grades, although several installations in Europe make fine paper and tissue.

The original Papriformer, as supplied to Southland, has an "S" wire-run configuration. The sheet is formed between the two wires in a nip formed by a solid breast roll and the forming roll. The forming roll on the Southland machine is a 48-in.-dia drilled roll with one suction box with a vacuum of about 4 in. of water (for 2700 fpm). The sandwich wraps this roll, and water is drained in both directions. The principle is then reversed as the sheet passes around the couch roll where vacuum is applied to the other side of the sheet.

On the Southland unit, typical operating conditions for the couch roll are 2 psi of pressure in the first compartment, followed by a stabilizing box at atmospheric pressure and two vacuum zones with 15 in. and 21 in. of water, respectively (at 2700 fpm).

The Voith Duoformer C also uses a zig-zag configuration, and is equipped with a suction forming roll and a suction couch roll. The No. 3 paper machine at Publishers Forest Products Co., Newberg, Ore., is the only Duoformer C operating in North America. This machine consistently produces newsprint at about 3400 fpm.

The Valmet Speed-Former is designed primarily for newsprint production, and has a solid forming roll and a suction couch roll. This unit has a somewhat unique wire run, since both rolls are inside the same wire loop. Currently, there are no Speed-Former installations in North America, but five units are operating worldwide.

The KMW Periformer MW uses a vacuum forming roll. The sheet wraps this roll and the top wire then separates. Six Periformer MW units are operating in the U.S., producing grades ranging from corrugating medium to towel. The largest of these is the 281-in.-wide unit at Owens-Illinois Inc. in Tomahawk, Wis. This machine is rated at 700 tpd on corrugating medium, and has a maximum operating speed of 3000 fpm. Several Periformer MW units in the U.S. are dedicated to towel production, and Fort Howard Paper Co. has a number of these units.

Hybrid formers

The most recent—and one of the most interesting—concepts in twin-wire forming is the hybrid unit. For the purpose of this discussion, the term hybrid is used to designate a paper machine where the sheet is initially laid on a fourdrinier table, after which a top wire is applied in some manner. Additional headboxes are not used in hybrid formers, and the top wire is used only for dewatering. Within the hybrid category, several units are available with machines designed both as rebuilds of existing fourdrinier paper machines and as complete new installations or complete new wet ends.

Examples of units designed for rebuilding an existing fourdrinier include Beloit's Bel Bond, Dominion Engineering's Dynaformer, Valmet's Syn-Former R, KMW's Periformer H, and Voith's Duoformer H.

When the various options available under the hybrid former category are considered, a further subdivision of unit types is necessary. With an existing fourdrinier modification, the top wire unit can dewater using a blade or shoe configuration, or the sheet and wires can wrap a roll or rolls.

The Bel Bond is an example of a unit where the fourdrinier wire initially dewaters the sheet and then the top wire contacts the felt side of the sheet. The top wire wraps a solid forming roll, followed by an inverted blade/suction box configuration. The first Bel Bond on paper grades started up in 1980 at MacMillan Bloedel Ltd. in Powell River, B.C. The 228-in.-wide No. 7 paper machine produces newsprint at speeds to 2500 fpm. Five paper machines are currently running with Bel Bonds in the U.S., one in Canada, and one in Mexico.

The Dominion Engineering Dynaformer and Voith Duoformer F are examples of upward drainage technology where roll forming is utilized. On the Dynaformer, after the sheet is formed on the fourdrinier table, the top wire wraps partially around a grooved roll (80% open area) and contacts the sheet as it wraps the bottom of the roll. The sandwich of the two wires and the sheet then passes upward and over the top of a second forming roll, which is a solid rubber-covered roll. Drainage occurs in both directions at the first forming roll, and upward only at the second solid forming roll. The two wires then pass under a transfer roll, and the top wire is separated at a 2° to 4° angle while the sheet follows the bottom wire. The first Dynaformer unit is not driven, but is powered by the fourdrinier wire. The first Dynaformer unit in North America should start up in late 1982 at Inland Empire Paper Co., Spokane, Wash.

Voith offers two hybrid former versions, one designed for rebuilding a fourdrinier (Duoformer H) and one designed as a totally new machine (Duoformer F). The Duoformer H is positioned on top of the fourdrinier, and is similar in concept to the Dynaformer. It also uses a solid forming roll. Most of the water is removed upward at the forming roll. The two wires separate over a solid wire roll, and the web follows the bottom wire to the suction couch roll passing over several flatboxes.

The Voith Duoformer F also has a short fourdrinier-type table followed by a top wire which sandwiches the sheet prior to the vacuum forming roll. The two wires separate from the forming roll, pass over a deflector on the top wire side, then wrap a suction couch roll on the bottom wire side. The two units are not interchangeable. The F configuration has a wider basis weight and speed range and greater flexibility and dewatering capacity. The first Duoformer F to be installed in the U.S. will start up at Union Camp Corp.'s new Eastover, S.C. mill and will produce uncoated fine papers.

Valmet has three hybrid former designs, the Sym-Former F, N, and R. The R unit is a recent offering designed for rebuilds of existing fourdriniers. It also utilizes a roll configuration to drain the sheet upwards. At the present time, there are no Sym-Former R machines operating in North America. The F and N configurations are similar in concept, and differ mainly in the grades produced. The F design utilizes a flat initial fourdrinier table, whereas the Sym-Former N has a table that slopes upward toward the second wire. The N design is primarily used for groundwood grades such as newsprint, and the F version is designed for fine papers, filled papers, and kraft papers. There are now three Sym-Former F units and one Sym-Former N unit operating in the U.S. Two Sym-Former N newsprint machines are operating in Canada. The Sym-Former N, due to its uphill dewatering zone and longer forming shoe section, has higher potential operating speeds.

The first commercial Valmet twin-wire machine started up on Sept. 6, 1973, at United Paper Mills in Simpele, Finland. The Sym-Former unit had a 116-in.-wide wire, a 109-in. dewatering shoe, and was originally designed for speeds to 2500 fpm on groundwood printing grades (18 lb/3000 ft^2 to 37 lb/3000 ft^2). The basic arrangement was similar to the Sym-Former F concept with a flat fourdrinier table initially forming the sheet.

The Escher Wyss Manchester versions of the hybrid are the Twin-Former and the Twinco Former. The Twin-Former is designed to increase the capacity of an existing fourdrinier, and drains the sheet upward by the roll concept. The Twinco is designed for lightweight printing papers, and is a hybrid unit with a top wire that drains the water as the wires pass over a large radius shoe and then around a smaller-diameter forming roll.

Multilayer with top fabric(s)

The majority of multilayer units are used in the manufacture of heavier-weight papers and paperboard grades, including kraft linerboard, bleached paperboard, and boxboard. A variety of units are used in this area worldwide, including the Bel Bond, Inverform, Voith Duoformer K, Tampella Arcu-Forma, and Kobayashi Ultra Twin-Former.

A recent entry into the field of twin-wire papermaking is the Tampella Contro Flo Former. The first commercial installation of this unit began operating in 1980 at the Enso-Gutzeit Oy mill in Pankakoski, Finland. The Contro Flo Former does not have a free discharge jet; instead, the headbox is sealed against the former. This unit is capable of operating at lower speeds than other twin-wire formers, and can produce high-basis-weight sheets.

As previously mentioned, the variety of formers designed for this application will not be discussed in detail here, although some of them do use twin-wire technology. An example of a very unusual machine is the No. 7 paper machine at Manville Forest Products Corp., West Monroe, La. This unit has a base Tampella fourdrinier, two Arcu-Forma twin-wires, and a minifourdrinier. The base fourdrinier has a 256-in. wire, and measures 92 ft from breast roll to couch roll. The two Arcu-Forma units are used to form filler plies, and are then "married" to the sheet on the base fourdrinier. A small top fourdrinier is used to form the top liner.

An example of the Bel Bond unit used for multi-ply boxboard production is the No. 3 paper machine at St. Regis in Battle Creek, Mich. This machine has five Bel Bond formers with a headbox at each station. □

CONSTRUCTION

Trend to merit shop construction increases in pulp, paper industry

Low-bid construction, performed by merit shop contractors, has in many cases reduced paper industry expansion costs, shortened building time

By SCOTT ROBERTSON

☐ Ten years ago, few people had ever heard of merit shop construction. At that time, a pulp and paper company with a major expansion to build probably could not have found more than one or two merit shop contractors large enough to handle the job. Since then, the volume of jobs performed by merit shop contractors has grown dramatically. In 1981, merit shop contractors performed 63% of all construction in the U.S.

The term merit shop construction still depends on the person(s) defining it. But in fact, merit shop construction projects are contracts let to the lowest bidder, whether or not that bidder is a signator to a union agreement. Included in the merit shop definition are union contractors who have agreements with building trades unions that allow them to subcontract work to nonunion subcontractors. The definition also includes the merit shop general contractors who subcontract work to union contractors. Or, in some cases, a contract may be an all nonunion project. Excluded from the definition are projects which, because of agreements with the building trades unions, are only let to unionized contractors.

High wages, cheap money

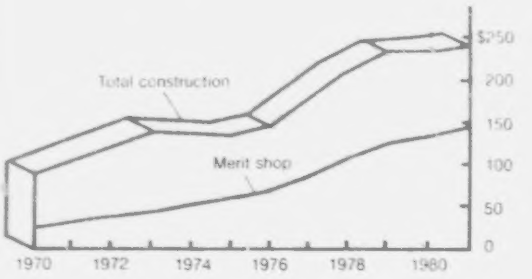
What brought about this change in building trends? High union wage settlements passed along to owners who once had no difficulty in obtaining cheap expansion money was the beginning. The "go-go" era of cheap money is gone now, but it set the stage for the rising use of merit shop construction in the pulp and paper industry.

In the late 1960s, all negotiated union wage rates began to rise faster than the country's productivity, with the building trades unions' wage rates leading all the rest by far. In some cases, construction unions were negotiating wage increases in excess of 30% annually. It should be kept in mind that this was occurring in 1960, not 1980. Union contractors who had enjoyed a monopoly on major industrial construction were passing these wage increases on to their clients. However, in 1968, construction users began a subtle rebellion which in little more than ten years has led to a major shift from union construction to merit shop construction.

In 1968, the U.S. Chamber of Commerce organized a conference of major construction users and contractors to discuss the problems of escalating wage rates and other labor problems that significantly added to the cost of building. Recommendations from that meeting centered around contractors dealing with construction unions on a united front basis. But in an industry of more than 200,000 contractors, such cooperation seemed unlikely.

However, the idea was good. But it languished until Roger Blough, former chairman of United States Steel, formed the Construction Users Roundtable, the forerunner of what is today called the Business Roundtable. The Roundtable began to gather top corporate leaders to discuss the consequences of construction users allowing the

Figure 1. **The merit shops' growing share of the contruction dollar**



Volume of merit shop construction compared with total construction volume, billions of dollars.

Source: Associated Builders & Contractors Inc.

Mr. Robertson is communications manager, BE&K Inc., Birmingham, Ala., and formerly was with Associated Builders & Contractors current trends to continue. As a result of the Roundtable's efforts, many of the nation's largest corporations began qualifying merit shop contractors to bid on major projects.

Sixty percent merit shop

According to the Associated Builders & Contractors (ABC)—the trade association for merit shop contractors—the merit shop segment of the construction industry did only about $18 million of work in 1968, or less than 20% of the total $87 billion construction market at that time. By 1981 the nation's total construction tab had reached $250 billion and the merit shop segment had grown to the point where it was doing almost 60%, or more than $150 billion of work.

The annual survey by the National Constructors Association (NCA), a group of the largest unionized industrial contractors, is indicative of the growth of the merit shop. In 1977, the NCA survey indicated only $28 billion of merit shop construction. By 1981 that figure had grown to more than $77 billion annually. Most of the major pulp and paper companies had representative projects on the merit shop list.

Some questions, which need to be answered to understand not only why there has been such a tremendous growth in merit shop construction, but also why the growth has not been even quicker, are discussed below. The advantages that merit shop construction offers the pulp and paper industry center around productivity, a potential 10% to 15% construction cost savings, management control, the elimination of a third party (union), and the ability to respond quickly to correct any project problems.

Savings not in wage rates

It is a surprise to many project managers that the cost savings on merit shop projects does not necessarily come in whole or, in some cases, even in part from wage rate savings. In most instances, there is parity in wages between merit shop workers and unionized workers. In fact, in some areas, merit shop wage rates actually exceed basic union wage rates. If there is disparity between merit shop and union wage rates, it is the result of the competitive labor market in the area of the project.

John R. Heizelman, writing as a senior estimator for Arco Oil & Gas, Dallas, Texas, recently outlined some of the savings to be found on merit shop projects. While his remarks centered around chemical and refinery construction, parallels can be fairly well drawn between that industry and the pulp and paper industry.

Some of the points Mr. Heizelman made include:

". . . If the job is in or near a large city that has been union controlled for any length of time, the productivity of all workers is lower than in a city of equal size not strongly unionized. As the control of a union decreases, the overall productivity of all workers improves."

". . . Union contractors pay show-up time of 2 hours/day/worker as long as the worker reports to the gate ready for work. If work is started and inclement weather stops it, the worker gets 4 hours of pay. If any work is performed after lunch hour, workers automatically receive 8 hours of pay (merit shop contractors normally pay only for the hours worked). Standard practice is to figure 5% of total wages for lost time on a union project."

". . . The union will determine the ratio of apprentices on the job. This rigid manpower loading is nonproductive and lends itself to an inefficient operation."

"...Under union work rules, the selection of craft foremen and general foremen is entirely the responsibility of the employer. But in actuality, the union selects the craft foreman, general foreman, and area foremen for unionized contractors."

The big nonboom

Mr. Heizelman's comments actually only scratch the surface of the differences between union and merit shop construction. Costs of jurisdiction disputes, shutdowns, slowdowns, and strikes, coupled with several hundred pages of work rules ("area practices"), can add significantly to the cost of union construction.

The next question that should be asked is: if union construction is so costly, why have all contracts not gone merit shop? In some areas they have. The unions seem to have never really made a serious attempt at modernizing work practices. Instead, they appear to have been waiting

Pulp and paper industry projects recently constructed by merit shop contractors

Hammermill Paper Co.	Selma, Ala.	International Paper Co.	Springhill, La.
International Paper Co.	Selma, Ala.	International Paper Co.	Mansfield, La.
Georgia-Pacific Corp.	Crosett, Ark.	Boise Cascade Corp.	Rumford, Maine
Southwest Forest Industries	Snowflake, Ariz.	Madison Paper Industries	Madison, Maine
Container Corp. of America	Fernandina Beach, Fla.	Weyerhaeuser Co.	Crawford County, Mich.
Georgia-Pacific Corp.	Palatka, Fla.	Kimberly-Clark Corp.	Cornith, Miss.
St. Regis Paper Co.	Pensacola, Fla.	Weyerhaeuser Co.	Columbus, Miss.
St. Regis Paper Co.	Cantoment, Fla.	Federal Paper Board Co.	Lilesville, N.C.
Continental Forest Industries	Port Wentworth, Ga.	Federal Paper Board Co.	Riegelwood, N.C.
Kimberly-Clark Corp.	Augusta, Ga.	Weyerhaeuser Co.	Valliant, Okla.
Macon Kraft Co.	Macon, Ga.	Union Camp Corp.	Eastover, S.C.
Proctor & Gamble	Oglethorpe, Ga.	Bato Co.	Richmond, Va.
Boise Southern Co.	DeRidder, La.	Bear Island Paper Co.	Hanover City, Va.
Georgia-Pacific Corp.	Plaquamine, La.	Continental Forest Industries	Hopewell, Va.

for a building boom for almost ten years to regain bargaining leverage.

However, the boom has not come. In fact, there has been a very important nonboom. For the first time small merit shop contractors have been allowed to grow over a long period of time and establish relationships that, in better economic times, might have been cut short by what was once the union's ability to corner manpower. However, over the last ten years the merit shop, working through its trade association, the ABC, has developed several construction user services as well as manpower training programs which may have permanently replaced the need for building trades unions, even if building booms in the future. For the first time, the merit shop has developed skill training programs currently in use on many pulp and paper construction sites. These training programs have totally revolutionized the administration of training and manpower in the construction industry.

Wheels of learning

ABC calls its training program "Wheels of Learning." The program allows contractors to train local hires to do specific tasks, which cuts costs on merit shop projects. The program also allows merit shop construction craftsmen to improve their skills and learn new technology. ABC has also established a Construction Buyer's Service Center with a computerized merit shop contractor referral service to help construction users locate contractors and suppliers throughout the country.

Most important, merit shop contractors have caused a sense of competition in the construction industry. This competition has actually reversed the trend of annual construction wage increases doubling those of manufacturing wages. Except on the West Coast, unionized contractors can no longer pass on exorbitant wage increases to construction users. However, many observers believe the West Coast and Pacific Northwest are now ripe for the same shift to merit shop construction that has taken place in the rest of the U.S. over the past decade.

The union's initial response to increased merit shop competition in the 1960s was what *Fortune Magazine* called a "full arsenal of traditional weapons—boycotts, picketing, violence, and all the political legislative pressure they could muster." But, in the pulp and paper industry, the building trades unions have generally found little sympathy from in-plant unions. Few workers have been willing to give up their jobs for temporary building tradesmen earning more than twice their wage rates.

The main reason for the success of merit shops is the tremendous amount of time and money saved by merit shop construction, and because most merit shop contractors have an experienced public relations, legal, and management staff familiar with labor related problems.

Unless abrupt changes occur in the advantages merit shop contractors offer clients in the pulp and paper industry, it is unlikely the current trend will stall. Merit shop contractors are already building in areas that were once thought to be "union-only" strongholds. Innovations in construction methods, human relations, training, and productivity are coming from the merit shop segment of the construction industry. And interestingly enough, the only changes that have occurred in the building trades have come about because of the competitive pressures placed upon the unions by the successful entrance of the merit shop into the free enterprise system. ☐

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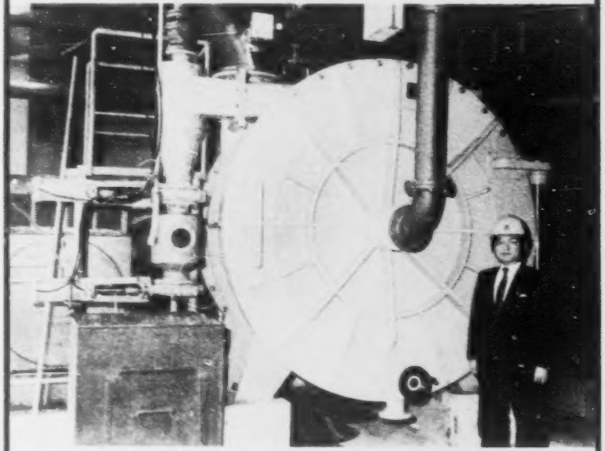

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On Reader Service Card **Circle 184**

Pulp mill market share growing, prices steady

By BARRY SHOCKETT

The overall market for hydrogen peroxide (H_2O_2) has been stagnant, but pulp mill usage has been growing steadily since 1979 at an average annual rate of 8% to 8.5%. Pulp mill usage could increase 20% to 25% in 1982. Total peroxide consumption should resume an 8%/year increase when economic conditions improve.

Consumption of Canadian hydrogen peroxide is expected to increase at least 30% this year, due primarily to growth in mechanical pulp production.

U.S. statistics for hydrogen peroxide (000 short tons)

	1979	1980	1981	1982e
Nameplate capacity	143	197	193	193
Production	114	116.5	112	115.5
Apparent consumption	124	109	107	108
Pulp bleaching	11.5	12	13	13
Exports	9	13.5	12.5	14.5
Imports	19	6	7.5	7

Sources: Bureau of Census, U.S. Dept. of Commerce, PULP & PAPER estimates

Canadian statistics for hydrogen peroxide (000 short tons)

	1979	1980	1981	1982e
Total demand	6.3	7.5	8.3	10
Pulp bleaching	4	5.2	5.7	7.5
Miscellaneous*	2.3	2.3	2.6	2.5
Imports	6.6	9.4	8.8	10
Exports	0.3	1.9	0.5	—

*Including textile bleaching and water treatment

HYDROGEN PEROXIDE

UNITED STATES

Uses: The pulp and paper industry uses H_2O_2 to bleach chemical, mechanical pulps and to deink recycled newspaper stock. Its major use is as a chemical intermediate. This is followed by the treatment of waste and water, textiles, and mining.

Demand: In 1982, an estimated 16,000 tons of H_2O_2 will be used in pulp bleaching, compared with 13,000 tons in 1981. Total consumption in 1982 is likely to reach 108,000 tons, up slightly from the 107,000 tons consumed last year. Bleaching applications have increased their share to 15% of the total. Chemical synthesis applications use almost 30% of the total product, but this market has been depressed recently due to weak chemical markets. Imports make up less than 7% of demand. This will decrease slightly in 1982.

Sources: U.S. producers include the following (in decreasing order to capacity): E.I. Dupont, FMC, Interox America, and PPG.

Availability: There exists sufficient surplus capacity to satisfy domestic U.S. demand, with last year's industry operating rate being less than 60%, compared with the 80% rate that was prevailing in 1979. 1981, market; 1980, market; 1979, market; 1978, market.

Pricing: Despite an attempted hike in price this summer, the 39.5¢/lb tag for 70% solution, f.o.b. producing point freight equalized, is still in effect. Pricing history: 1981, 39.5¢/lb; 1980, 35.5¢-36.5¢/lb; 1979, 32.5¢/lb.

Forecast: The increased use on chemical pulps, added with a move by many newsprint mills towards higher-brightness groundwood sheets, should maintain an annual growth by the pulp and paper industry of close to 10% for the next few years. No price increase is expected until late in the fourth quarter this year or early in the first quarter of 1983, and will probably be in the neighborhood of 10%.

CANADA

Uses: Mechanical and chemical pulp bleaching consumes most of the H_2O_2 that is produced. Other uses for this chemical include textiles and treatment of water.

Demand: The pulp and paper industry will use an estimated 7500 tons (75% of total) of H_2O_2 in 1982, a 30% increase from the 5700 tons used in in 1981. Total demand should rise to 10,000 tons from 8300 tons in 1981.

Sources: Imports supply the total Canadian demand for hydrogen peroxide, about 80% of the market accounted for by U.S. product. The major importers of this chemical are C-I-L (from FMC) and DuPont Canada (from its U.S. parent). Both FMC and E.I. Dupont sell on a direct basis as well, as does Interox America.

Availability: The Canadian demand can be easily supplied by the excess U.S. capacity. 1982, market; 1981, market; 1980, market to tight; 1979, market; 1978, market.

Pricing: As in the case in the U.S., there has been no price change since January 1981. Bulk 70% solution, f.o.b. works, is still listing at \$1.16/kg (52.2¢/lb). Pricing history is: 1981, \$1.16/kg (52.2¢/lb); 1980, 95.8¢-\$1.05/kg (43.5¢-47.5¢/lb); 1979, 90.6¢-95.8¢/kg (41¢-43.5¢/lb).

Forecast: The strong growth in thermomechanical (TMP) pulping capacity as well as the switch by many newsprint mills to groundwood specialties should result in an annual increase. This annual increase should average almost 17% to 1985. This amount is twice the average rate realized over the last three years of the previous decade.

The consumption of H_2O_2 next year will be futher increased when West Fraser begins to use peroxide bleaching at Quesnel River Pulp. Half of the TMP output of the mill is being converted to chemimechanical (CTMP) pulp. West Fraser will be switching over to peroxide in July 1983.

Mr. Shockett is consulting editor-chemical markets for PULP & PAPER.

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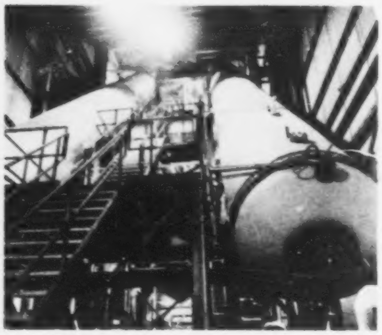

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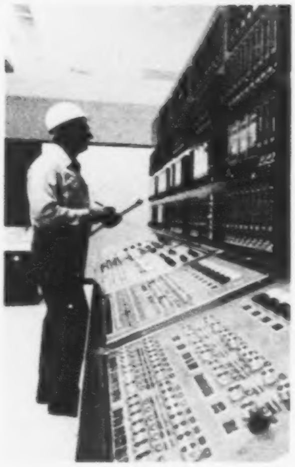

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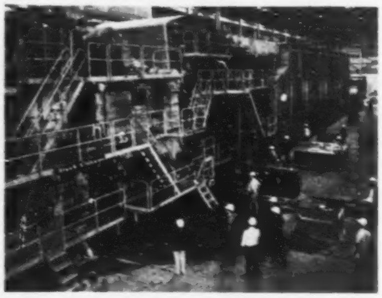

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COVER: *Time-lapse night photograph of Union Camp Corp.'s Franklin, Va., mill, where new $37-million oxygen bleaching system is now on-line (see story on page 90). Photo courtesy of Airco Industrial Gases, Murray Hill, N.J.*

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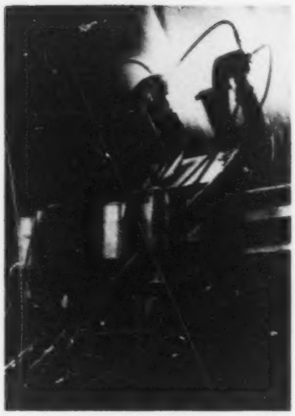

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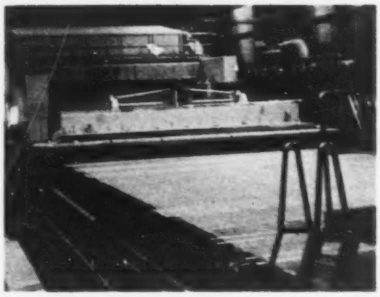

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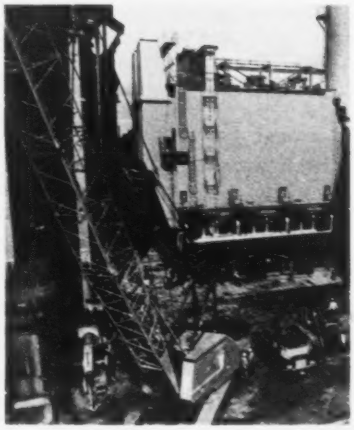

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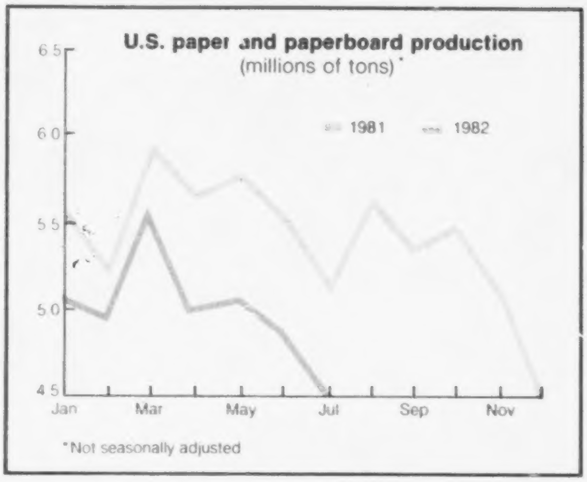
MONTH IN STATISTICS

U.S. paper and paperboard production in July totaled 4.5 million short tons, down 8.7% below the July 1981 total, according to the American Paper Institute. Adjusted for seasonal and workday factors, the July-August production rate, based on data for the first two weeks of August, came close to 57.6 million tpy, down from the second-quarter average of 57.8 million tpy and the first-quarter average of 60.0 million tpy.

Among major grades, newsprint production fell in July, although just about matching its year-ago level for the first seven months, and printing/writing paper output declined largely as a result of weakness in uncoated free sheet. Tissue production has been flat since April, while some strength is evident in packaging/industrial grades. All major grades of paperboard continued to show declines in production in July, with the largest falloff in unbleached kraft linerboard, down 14% from year ago.

Total Canadian newsprint shipments in July came to 615,000 metric tons, down 16.6% from July 1981, according to the Canadian Pulp & Paper Assn. Newsprint mill operating rates slipped to 71% in July from 79% in June and were well below the 87% rate of a year earlier.



*Not seasonally adjusted

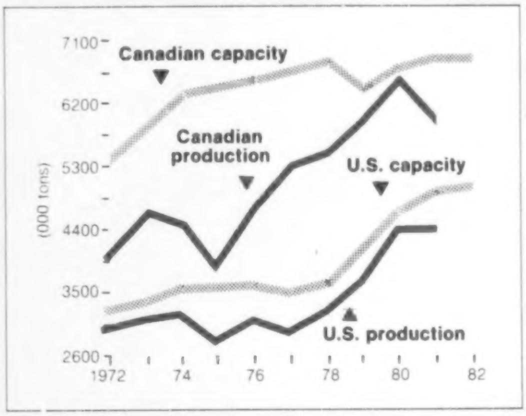
		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	July	400	−10.3	5,177	0.1
Uncoated groundwood (s)	July	114	1.8	1,401	−4.6
Coated paper (s)	July	392	1.6	4,920	0.4
Uncoated free sheet (s)	July	563	−9.3	7,708	−4.2
Unbleached kraft packaging and industrial (s)	July	285	−4.0	3,618	−8.8
Tissue	July	330	−4.9	4,347	−3.0
Total paper	**July**	**2,303**	**−5.6**	**30,138**	**−3.4**
Kraft linerboard, unbleached	July	1,004	−14.1	13,623	−9.0
Semichemical medium	July	344	−11.6	4,441	−9.3
Bleached paperboard	July	294	−9.0	3,763	−6.9
Recycled paperboard	July	481	−8.4	6,642	−7.7
Total paperboard	**July**	**2,208**	**−11.8**	**29,548**	**−8.4**
Total paper and paperboard*	**July**	**4,511**	**−8.7**	**59,686**	**−5.9**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	June	4,181	−5.3	51,033	−4.5
Market pulp production	June	491	−8.7	5,999	−4.2
Wastepaper consumption at paper/board mills	June	1,136	−8.3	13,877	−3.8
Pulpwood consumption (cords)	July	6,737	−0.8	79,502	−1.8
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	July	18.610	−10.1	136.200†	−6.8
Containerboard inventories at box plants	July 1	2,649	11.9		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	June	705	3.4	8,099	−5.1
Imports of Canadian newsprint	June	570	0.4	6,792†	−4.3
U.S. paper exports (including products)	June	386	−1.3	4,300	−13.7
Exports of unbleached kraft linerboard	July	146	−18.9	1,917	−4.3
Exports of woodpulp	June	302	−15.9	3,575	−7.7
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	July	615	−16.6	4,761†	−8.2
Operating rates	July	71%	87%	86%	95%
Inventories held by U.S. consumers	July 31	1,511	3.4		
Woodpulp shipments (export only)	July	465	4.7	3,443†	−16.2
Operating rates	July	68%	72%	81%	89%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn.
*Includes construction and wet machine grades. †Not annualized. ‡Not directly comparable to year ago because of coding change. (s) = shipments.

Paper-grade chemical market pulp: Market still in downswing

Statistics:	**1980**	**1981**	**1982e**
UNITED STATES			
Production, 000 tons*	4457	4402	4190
Annual capacity, 000 tons	4653	4897	4943
Utilization rate, %	95.8	89.9	84.8
Apparent U.S. consumption, 000 tons	4547	4474	4000
Imports, 000 tons	2438	2390	2060
Exports, 000 tons	2348	2318	2250
CANADA			
Production, 000 tons	6605	6080	5000
Annual capacity, 000 tons	6690	6810	6810
Utilization rate, %	98.7	89.3	73.4

*Market pulp reported in metric tons (metric ton=2205 lb or 1.1023 short tons)



Grade structure: Paper-grade chemical market pulp is sold competitively in the market and does not include captive pulp used on-site or shipped to affiliated mills within North America. It includes bleached and unbleached sulfite, bleached, semibleached, and unbleached kraft and soda pulps. Pulp is sold in sheeted or flash-dried bales, as roll pulp, or as fluff pulp which is also sold in rolls. Paper-grade chemical pulp is sold for use in paper and paperboard and for some nonpaper products such as diapers and molded items.

Production/capacity: In 1981, North American chemical paper-grade market pulp production totaled 10.48 million metric tons, down 5.2% from 11.06 million tons the previous year, with most of the decline in Canada caused by a six-week strike in British Columbia. This year North American pulp production is expected to decline about 12%, to 9.2 million tons, due to weak worldwide demand and relatively high inventory levels.

U.S. production is expected to decline about 5%, to 4.2 million tons, while Canadian output is expected to drop about 18%, to 5 million tons. U.S. mills have tended to run at higher levels this year and marketed their output aggressively, while Canadian and Scandinavian producers have taken more downtime.

Shipments by U.S. mills were down 1% for the first seven months of 1982, while those from Canada dropped 19% and Sweden's declined 17%. Operating rates for all five North American and Scandinavian producing countries for the seven-month period averaged 80.5% compared with 88.5% in the same period of 1981.

Nevertheless, Norscan producer stocks at the end of July stood at 1.87 million tons, up from 1.4 million at the end of December, when an approximately average level was reached.

Pricing: Sluggish demand and the strong U.S. dollar have caused a serious deterioration in pricing. Northern bleached softwood kraft (NBSK) pulp began to erode in the second quarter and by early August had reached the $465/metric ton c.i.f. level in northern Europe. This was down from the $545 price which has prevailed since the last successful price increase in second-quarter 1980. Deterioration in southern softwood and hardwood pulp prices came earlier and has been more severe, with a $100/ton or more gap developing between NBSK and these shorter-fiber pulps in both Europe and the U.S.

In the domestic market in early August, NBSK was still reported to be selling mainly at $490/metric ton ($445 short) list, southern softwood kraft at $370 to $390/short ton, and southern hardwood at $330 to $350, with spot sales considerably below these levels and more deterioration in contract levels likely.

Year-end prices for these grades in $/short ton U.S. market were (*indicate discounting from list levels): northern bleached softwood kraft—1975, $372; 1976, $372*; 1977, $310*; 1978, $340; 1979, $417; 1980, $481; 1981, $513; southern bleached softwood kraft—1975, $340; 1976, $320*; 1977, $280*; 1978, $321; 1979, $400; 1980, $475; 1981, $475; southern bleached hardwood kraft—1975, $320; 1976, $280*; 1977, $240*; 1978 $290; 1979, $385; 1980, $458; 1981, $458*.

Outlook: While pulp prices will probably bottom out late this year, any market improvement will lag overall recovery of the paper industry and probably not come until well into 1983.

Estimated capacities of major companies are:

	Annual capacity (000 metric tons)	**Capacity share** (%)
1. Weyerhaeuser^{1,2,3,5}	1000	8.5
2. Georgia-Pacific^{1,2,5}	700	6.0
3. BC Timber^{1,3}	580	4.9
4. Parsons & Whittemore^{1,2}	570	4.8
5. Great Lakes Forest^{1,2,3}	570	4.8
6. Canadian Forest Products^{1,3,4}	505	4.3
7. B.C. Forest Products^{1,3,4}	490	4.2
8. Procter & Gamble^{1,5}	480	4.1
9. MacMillan Bloedel^{1,3,4}	430	3.7
10. Noranda^{1,2}	363	3.1
11. Federal Paper Board^{1,2}	355	3.0
12. Boise Cascade^{1,4}	355	3.0
13. International Paper^{1,2}	315	2.7
14. ITT Rayonier^{1,5}	305	2.6
15. Scott Paper^{1,2,5}	300	2.6

Key to grades: 1—bleached softwood kraft; 2—bleached hardwood kraft; 3—semibleached softwood kraft; 4—unbleached softwood kraft; 5—bleached sulfite

*Capacity shares based on equity ownership, excluding less than 50%-owned affiliates

North American capacity (1982): **11,753 million tons**
Capacity share of top five companies: 29.1%
Capacity share of top ten companies: 48.4%

U.S. bleached board supply/demand

Full operating rates likely by 1984; export milk carton, ovenable board shipments look promising; so does the domestic asceptic market

By DAVID R. ALLAN, News Editor

☐ Despite the reasonably healthy performance of the solid bleached sulfate (SBS) market in the deep recession of 1982, widespread doubts persist about the future vitality of this sector of the industry—resulting largely from the decade-long slump in domestic paperboard milk carton demand. But as International Paper Co. consumer packaging vice president Glen Dell told PULP & PAPER in the following interview about the overall status of the solid bleached board market, important end-uses for SBS—including domestic milk board—give reason for optimism about the mid-1980s.

DELL

Dell: I think there are two false impressions that over the last couple of years, certain of our customers as well as other suppliers and the market in general have had. The first one is that the bleached board market is going to be so tight that it will be very short of capacity. Some of our customers have been afraid that prices would run up dramatically, making bleached board uncompetitive.

P&P: *You think this is a false impression?*

Dell: I think it is, because, even though some capacity's come out of the industry, some is going in. There are machine speedups taking place, and IP in particular is increasing capacity. That will add to the bleached board system, and keep supply and demand in good balance.

The other false impression is the one that people get when they just look at U.S. data, not recognizing that bleached board markets are really worldwide. And they've tended to look at only U.S. supply/demand and say there is significant overcapacity. That's not true, either, because of the rapidly growing export markets. But while one group has been talking about overcapacity, another group has been talking about tight markets. I don't think either view is accurate.

The first chart (Figure 1) shows IP's view of worldwide demand and supply a year ago. Let me emphasize it's the total bleached board market. In about 1982, demand slightly exceeds capacity. These are API capacity figures and they don't recognize, for example, IP's reconfiguration of the Georgetown mill, which is going to add about 100,000 tons to the bleached board market. Unfortunately, some people looked at the chart and didn't hear the words.

I've updated that chart (Figure 2). Some changes have happened since a year ago. One is, the economy didn't recover this year, so there's been a flattening, in fact even some slackening of demand. In terms of those long-term growth trends, there's obviously been in 1981 and 1982 much lower demand. That put the five-year growth trend lower. The demand line, in our judgement, has come down. API lowered capacity figures between last year and this year, but our own capacity has been built into that. You'll see that it just about reaches full capacity in 1984, but doesn't cross over. Demand does not move forward and exceed capacity. We have a relatively balanced situation. That's the overview as I see it.

P&P: *What is your estimate of total bleached board productive capacity? How much of that would you call "swing capacity" between board and market pulp? How much, if any, constitutes swing capacity between bleached board and bristols?*

Dell: I think the easiest way to express it is that by our calculations, U.S. capacity in bleached board machines is 5.5 million tpy. That's sourced from API. Of that, as we look at 1982, it's our estimate that 61% is generally dedicated to bleached board, 14% to bristols, 3% to pulp, and 22% swing capacity—any and all swing capacity.

Our system is such that we can move straight through the whole line, from bristols to folding to milk to cup to diaper pulp and almost any combination. Obviously, two of our machines have clay-coaters and three do not. You can't make folding carton stock on the three without coaters, but we do make milk carton stock, for example, on the two with coaters; therefore, there's a tremendous flexibility in our system. In fact, a lot of that U.S. swing capacity is in our system.

P&P: *What capacity trends do you see in the next five to seven years?*

balance depends on export markets

Dell: What I'd like to do is now focus in on the bleached board piece of that rather than dealing with bristols or pulp, which are not my responsibility. With bleached board, our estimate of the capacity increase between 1982 and 1987, to take a five-year period, is about 123,000 tons, most of which is IP's.

It could be more. If demand were higher, more of our capacity would be allocated to bleached board, so that capacity is somewhat dependent on demand. If that demand line were to increase, more of our capacity could be allocated to bleached board.

One difficulty is that a competitive bleached board machine—a new one—in my judgement, would have to be able to produce at least 250,000 to 300,000 tpy. There's not enough market growth, I don't believe, to encourage someone to put in a whole new machine. The capacity growth has to come from someone with the system capability that we have. Demand, as I see it, will not justify a greenfield mill or even a new machine over the next five years.

P&P: *One theory argues that current bleached board prices are too low to justify a completely new machine, and that if prices were to rise fast enough to justify new machines, then that might endanger the competitiveness of bleached board as opposed to other materials. Do you agree with that theory?*

Dell: Yes, I agree, but I would turn that around. I don't think that demand is sufficient to justify a totally new world-scale machine, and that in turn tends to dictate both price and return.

P&P: *Does that also mean you don't expect to see any dramatic price increases over the next five years that would justify that kind of expansion?*

Dell: I do not expect to see the kind of price increases that would justify new machines.

P&P: *Would you expect mills which are in a swing position, vis a vis market pulp, bleached board, and bristols to run better in terms of operating rates in the next five years than those that strictly produce milk carton stock or folding carton or whatever?*

Dell: No. A great deal of the capacity is not swing capacity and is geared more to specific markets and generally, therefore, can be more competitive in those markets.

P&P: *What operating rate do you expect for the bleached board industry this year?*

Dell: About 95%.

P&P: *In the fall of 1981 I think it was running in the 92% to 94% range; is it running close to 95% now? And what do you think will be the average for the next five years?*

Figure 1. **1981 projections: worldwide demand and supply for bleached packaging paperboard,1975-1985**

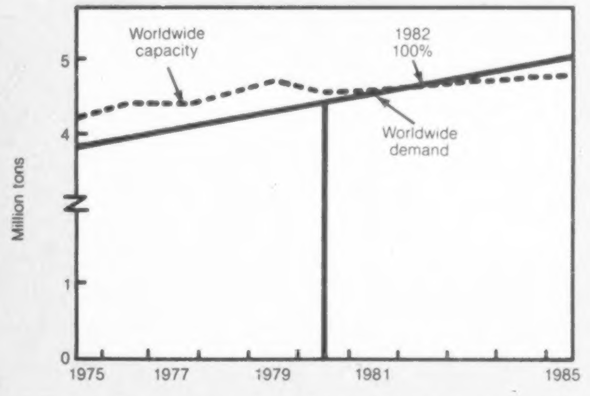
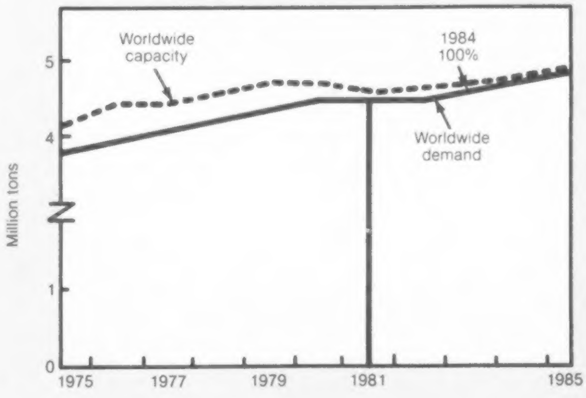


Figure 2. **Current projections: worldwide demand and supply for bleached packaging paperboard, 1975-1985**



Dell: It's about 95% right now. And I expect to see that 95% moving up to about 100% in 1984 and remain about 100%. It would change, obviously, if we had a recessionary dip out there. Our numbers are what we consider to be practical available capacity. Our numbers would indicate in the mid-90s. At any point in time, very late in the year, we all tend to build inventory and move towards downtime to perform maintenance or modernization work on the mills. Before Christmas, we built inventory and then took the machines down to work in the mills. So looking at any one time, it's a factor not only of the market but also the mill schedule.

P&P: *One observer told us that while total production of bleached board last year was up only 0.6% according to Census Bureau data, most of the growth was caused by inventory building during the year. Would you agree?*
Dell: I think that the bleached board statistics last year included some statistics of pulp. I don't think there was really an increase in bleached board shipments last year. Some companies, when demand weakened, ran roll pulp on their bleached board machines and it was classified as bleached board.

P&P: *What area of bleached board would you think would show the effect of a recovery in the economy first—folding cartons, milk...?*
Dell: Folding.

P&P: *Would that be because more people are eating out?*
Dell: No, it would be because one of the end-use markets I expect to improve over the next few years is frozen foods. Most market analysis has indicated that, over time, convenience foods—frozen foods—will be in greater demand. The economy has been in difficulty in the last few years, so higher-priced food hasn't increased. In fact, there's been a decline in frozen foods. Frozen foods are almost entirely bleached board; therefore, as frozen foods pick up, bleached board can be expected to increase. The general trend is tied very closely to the nondurables index. The higher-value foods tend to be packaged in paperboard. As people move to food purchases that are higher-valued, they tend to move more into cartons.

P&P: *Has the retort pouch had any effect on bleached board?*
Dell: None. Its time hasn't come yet.

P&P: *Will its time come in the next five years or so?*
Dell: Not enough to really affect these markets. You could argue that the retort pouch may substitute for frozen foods, but retort pouches are sold in cartons.

P&P: *Is the recession tipping the balance one way or the other in the battle for market share between recycled board and SBS? In the long term, where is the shift favoring SBS and where, in terms of end-uses, is the market-share shift favoring recycled board?*
Dell: Yes, I think it has been affected by the recession. I think you'll see that market share in folding cartons of recycled is up and bleached board down in 1982. There are two reasons: one is the end-use markets. Sales of cereal and dry foods, which use recycled board, tend to increase in a recession, and frozen foods, which use SBS, don't. Secondly, there have been switches to recycled board because of the lower prices. The basic furnish of recycled board is wastepaper, and waste prices have decreased dramatically. Waste prices are down at levels equivalent to 1968 and 1969, which makes the furnish, and therefore the board, less expensive. For some end-uses, packagers have chosen the less-expensive board.

P&P: *Is that going to swing back in the next year?*
Dell: Somewhat. I think there is enough growth in some of the SBS end-use markets to keep it relatively stable. I would expect a little faster growth probably in recycled board against SBS for folding cartons, but I expect growth in both.

P&P: *Would that slightly faster growth in recycled be due to continued pressure on the packager to cut his package costs?*
Dell: Yes. There's always going to be a trend to reduce costs. We've seen it as customers reduce the basis weight of board. They go down to lower-caliper board. When they can switch to a recycled board from an SBS sheet, that sometimes happens. But as we come out of this recession, waste prices will increase and the price differential between SBS and recycled will narrow.

The rapid increase in SBS prices from 1978 onward has been driven by energy costs. Many SBS suppliers are putting capital into reducing energy costs. At IP we're doing engineering work right now on coal conversions that should help keep escalating costs down, and so I believe the gap between recycled board and SBS will close for two reasons: One, we'll be able to do a better job of controlling energy costs; and secondly, waste prices will increase and result in higher furnish costs for recycled board.

P&P: *What is your estimate for total production of milk carton stock last year?*
Dell: Total U.S. SBS production, excluding bristols and pulp, was 3,840,000 tons. Milk, 1,033,000; folding, 1,707,000; bleached liner, 98,000; cup stock, 460,000; plate, dish, and tray, 291,000; and all other, 251,000.

P&P: *Would you expect that the more rapid growth rate of folding carton as opposed to milk carton stock over the last decade will continue? Will the trend of recent years toward lower per capita use of milk cartons in the U.S. continue? If so, when will use hit bottom, or will it disappear completely? Are there any marketing developments or economic trends that might stem the decline of domestic milk carton consumption?*
Dell: Domestic use of milk cartons has declined. You used a decade, but let me go back five years: It's declined about 5% a year. I forecast over the next five years a 4% decline rather than 5%. Basically, the slowdown is bottoming out. Fluid milk consumption has been flat, and the decline in bleached board cartons has been due to the use of plastic gallon containers. Plastic gallon containers have moved geographically across the U.S.. The last area to move to plastic was the Pacific Northwest, so now the decline should slow.

I expect the trend to plastics to bottom out—probably in the mid-80s. Over the next two or three years, however, the carton market will still be declining. But there may be a factor that will change this, because the industry is going to launch a print and radio advertising campaign followed by a television advertising campaign for the consumer. It will point out that there is a vitamin loss—vitamin A and vitamin B2—in plastic containers.

Deterioration comes from effects of light; fluorescent or incandescent light. It's especially true in low-fat milk. About half of the market is now low-fat. In the processing of low-fat milk, natural vitamin A is lost and the dairies have added vitamin A. The vitamin A that is added is lost very quickly in containers such as plastic or glass which let fluorescent or incandescent light reach the milk. In 24 hours, 85% of it is lost. There's a significant loss in vitamin B2 also. We're telling consumers that milk is a super beverage. It's nutritional, and it's good for kids. But if they buy it in plastic, they're losing some of the nutritional value that it provides.

P&P: *Would you expect that the current flattening out of energy cost increases would improve the economics of the plastic container vs the paperboard carton?*

Dell: That's not really significant. We can provide two paper half-gallons, with a handle, for just about the same cost as a plastic gallon. The issue hasn't been the price of the package. The issue has been how supermarkets have priced a gallon of milk vs two half-gallons. In fact in this advertising campaign, we're promoting paperboard on the basis of what we call the 2-Pak gallon.

Our focus group studies indicate that consumers perceive value in buying a gallon—value in the sense that it's less expensive. Because we're providing a paperboard gallon package, the consumer now has the choice between the plastic gallon and the paperboard gallon. The cost of the packages is relatively the same, so the choice can now clearly be made according to which is more convenient, easier to handle, which stays fresh longer, which tastes better and which loses its nutrients.

P&P: *What would you expect to see happen to milk carton shipments this year and in five years? What is the outlook for export shipments?*

Dell: Let me take the entire milk carton market, and add the export shipments. Exports have been growing about 8% the last five years, and the growth in the export market is now larger than the decline in the U.S. market. So even with my forecast showing the U.S. market declining 4% a year, I think exports will grow at least 5% a year. So total growth will be at least 1% for paperboard milk cartons worldwide from U.S. capacity.

In fact, the deterioration in milk cartons per se has been worse than 5%, but it's been offset by rapidly growing juice consumption and, therefore, rapidly growing paperboard juice cartons.

P&P: *How large is the [juice board] base right now?*

Dell: It's about 70,000 tons and growing in the 8% to 10% a year range. It grew 8.5% in 1981.

P&P: *Which countries or regions of the world represent the strongest markets for U.S. [liquid packaging board] exports? Which will level off in this decade?*

Dell: Most significant is the Far East. Africa is also strong. Europe, we estimate, is going to grow in the 5% to 6% range; the Far East, a little faster growth. Countries like Korea are concerned about nutrition for their children and are promoting the use of milk and the growth of herds. Japan, for example, is using more and more milk, promoting the use of milk, as well as juice.

P&P: *Is the Japanese milk market as a whole still small?*

Dell: Well, it's small on a per capita basis compared to the U.S.; on the other hand, the total Japanese milk [carton stock] market is over 150,000 tons and growing.

P&P: *How much of that is produced domestically?*

Dell: It's mostly U.S. board.

P&P: *What kind of growth rate do you see in that?*

Dell: Probably 6% or 7%.

P&P: *Will the long-term trend toward asceptic packaging in Europe help the paperboard industry?*

Dell: Yes, but there is also growth in fresh milk sales in Europe. In the U.K., much of the market is still glass. There are some European milk carton suppliers using U.S. board who are about to try to make a switch in the U.K. market from glass to paperboard. The initial push will be for fresh milk rather than aseptic.

In Germany, Austria, and France, the growth over a 10-year period has been much faster in aseptic than in fresh milk. In Germany, for example, the market was about 50:50 aseptic and fresh. Over the last two years, the stronger growth has been in fresh. People are beginning to use milk more as a beverage rather than in cooking and in coffee.

The figures that I've been giving you are for bleached board to package fresh milk. Most aseptic board today is coming out of Europe, not the U.S. As the aseptic market grows, we will probably develop the capacity to serve it, but that's all outside of these figures.

P&P: *Aside from milk cartons, what products are among the fastest-growing consumers of export SBS?*

Dell: Liquid packaging is the fastest growing from a large base. Export folding carton stock has been growing a little more rapidly than domestic, largely because the U.S. has the fiber to support world folding markets.

In new product areas, ovenable containers are beginning to grow from a small base; some goes into export markets. One of the products that I'm very excited about is paperboard cans. We call it CanShield, an effective substitute for glass, metal, fiber cans, perhaps even for bag and box applications. IP provides an in-house forming machine so that a customer can use a preprinted blank in his own plant on his filling line to form a can. Initial uses are dry foods and snack foods, but it's moving into yogurt; it can move to greasy foods, pet foods, powdered drink mixes, ice cream, and as we further develop the concept, perhaps even into liquids. There's very high interest in the U.S. Overseas, Japan, for example, is already packaging potato chips in this type of container. The board will come from the U.S. It's a very small base—you can't expect over a five-year period to talk in terms of 100,000 tons—but it's growing.

Even if there are some end-use markets that switch from SBS to machine clay-coated news, there are enough new applications for bleached board for it to be on a growth trend in the 1% to 2% range. I think the charts I've showed you, which deal with the next five years, come out with total world demand growth of just under 2%. Frankly, we've been re-estimating that every year for the past three years and we've always come out around 2%. For the last five years, it's grown 2.1%.

P&P: *Is the plate, cup, dish, and tray market a pretty mature market or are there trends in place that could* *continue or foster increased growth in demand?*

Dell: It's fairly mature except for the fast food industry. As many of the U.S. fast food companies move overseas, they take with them demand for cups, cartons and french fry scoops. Most of the board for that's going to have to come from the U.S.

P&P: *What kind of growth rate do you see in domestic folding carton?*

Dell: In the five-year period from 1981 to 1985, only just 0.3%. That's because of the low 1982 year.

P&P: *How big is the ovenable board market right now?*

Dell: It's about 10,000 tons and has been doubling every year. It's going to grow dramatically as the microwave oven penetration gets higher in the U.S. and as food processors begin to change to trays which can be used in microwave ovens.

There will be two major factors that will increase the growth. One is when we come out of the recession, the economy improves and people buy more frozen foods. And secondly, when microwave oven penetration reaches 45% or 50%, food processors are then going to want the dual oven capability *(Editor's note: IP estimates current microwave penetration at 25% to 30%.)*

P&P: *How big is the aseptic market today and how big would you expect it to be in five years, in the U.S.?*

Dell: It's just beginning. I think we're going to see rapid growth in juice applications. Companies that have already been in test market have been very pleased with it. There are differing opinions on how fast the aseptic milk market will grow in the U.S. Some very large dairy cooperatives believe that they can sell milk as a beverage in small sizes, and that aseptic milk will grow rapidly, especially flavored milk. They're putting quite a lot of money into that.

It's just very difficult at this point to estimate how fast it will grow. At IP we've developed aseptic systems for both milk and juice and we plan to provide the systems and provide the packaging materials. It would not be unreasonable in five years to expect to see demand at 40,000 or 50,000 tons, but that's a guess.

P&P: *What are the cost advantages for milk and juice in aseptic vs other technologies? Obviously it cuts down on refrigeration costs. But on a package-by-package basis, is there a cost advantage for aseptic?*

Dell: An aseptic package uses foil-laminated board, so it's more expensive than the current package for milk and juice; on the other hand, it's less expensive than metal or glass. But the shelf life, whether it's refrigerated or nonrefrigerated, is extended dramatically.

P&P: *Do you see a growing role for multi-ply boxboards containing a lower-cost inner layer(s) such as thermomechanical pulp (TMP) or secondary fiber in traditional SBS markets? Have the two such new machines started up in North America in recent years proven successful?*

Dell: There have been two machines, and I understand that there have been difficulties with both of them.

P&P: *Do they have economic advantages?*

Dell: I'm not sure. With energy costs going up dramatically, TMP has become more expensive than estimated five years ago. ☐

Aseptic cartons

By WILL MIES, News/Business Editor

Aseptic packaging appears to be off to a fast start in the U.S. and promises to open new markets for paperboard at the expense of glass bottles and metal cans, but how large this demand will become still remains unclear.

Such cartons—which can keep unrefrigerated juice, milk and other specialty food products fresh for up to six months—are common in Europe and many other parts of the world. But their introduction into the U.S. awaited last year's FDA approval of hydrogen peroxide as a sterilizing agent.

Test marketing flurry. Already a number of major food processors such as Ocean Spray, Borden, Coca-Cola Foods, and Del Monte have introduced fruit juices and drinks in aseptic cartons into test markets around the country. And some large milk suppliers are coming out with dairy products in such packaging this year. Dairyman Inc., for example, recently opened a $16-million aseptic processing plant in Savannah, Ga., with an initial capacity of 80,000 gal/day.

Leading this rapid market development has been Brik Pak Inc., a Dallas-based subsidiary of Sweden's Tetra Pak International, which submitted data for the FDA regulation. The company says it has commitments from the U.S. food and dairy industry for more than 60 aseptic packaging installations to go on-stream in 1982 alone.

In these machines, a strip of laminate is taken off a reel, sterilized with hydrogen peroxide, and formed into a tube. The liquid, which has been separately sterilized, fills the tube, which is then pinched off into individual packages with the product hermetically sealed inside. The resulting flexible brick-shaped packages range from 0.2 to 1 liter (6.8 oz to 1.1 quarts) in size. Since its first commercial installation in the early 1950s, Tetra Pak has dominated the aseptic packaging market, with 2200 installations worldwide last year which churned out 17 billion aseptic cartons.

Crowded machinery field. Other suppliers of brick-style carton filling machines are Blocpak Inc., a Toronto-based subsidiary of West Germany's PKL GmbH, and International Paper, which has acquired rights to European-designed equipment. Blocpak has leases for more than 10 of its Combibloc filling machines in North America, while IP has been conducting customer trials of its aseptic equipment in Walkill, N.Y., and has commitments from Real Fresh, a Visalia, Calif., dairy, and General Foods for commercial installations.

For those preferring the familiar gable-top carton, Ex-Cel-lo-O Corp., Troy, Mich., has a machine that makes a foil-lined "extended shelf life" version of its widely licensed Pure-Pak carton; and Liqui-Pack International Inc. of St. Paul, Minn., has a machine for aseptically filling gable-top cartons.

IP is also demonstrating a "hot-fill" packaging system in Mobile, Ala., and has commitments for installations from Lincoln Foods, Lawrence, Mass., and Tree Fresh Foods Corp., Avon Park, Fla. Using the heated beverage for carton sterilization, hot-fill can extend unrefrigerated shelf life for several months and refrigerated life for up to six months. Larger size (64-oz) gable-top laminated cartons can be used, but only certain types of juices and drinks can be processed without